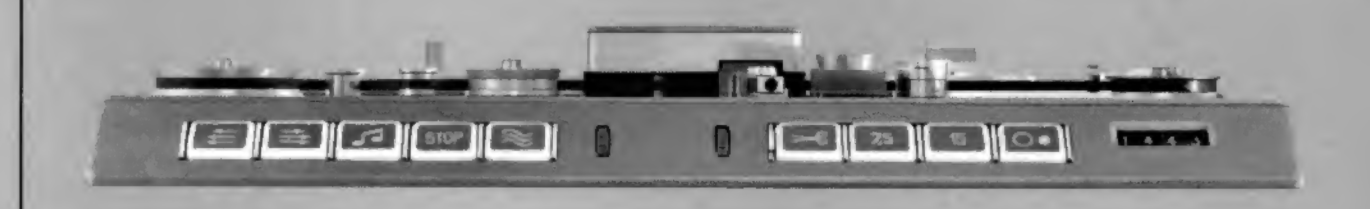
STUDER



Studio-Tape Recorder

J37

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Manufacturer of Magnetic Tape Recorders

Studio Tape Recorder Studer J 37



No. 11.005.365.

Studio Tape Recorder Studer J 37

Due to its up to date design and the care in manufacture the studio tape recorder "STUDER J-37" will meet all the requirements of a modern recording studio. The outstanding features of this machine are its high quality, versatility and simplicity in operation.

The idea of the "building block principle", on which the design of the recorder is based, allows easy access to any part of the machine and replacing a faulty assembly is a matter of seconds. The wiring of the machine is arranged so as to permit the adaptation to new requirements, simply by using the appropriate amplifiers and head blocks. Maintenance and servicing are reduced to a minimum.

The use of one inch (25.4 mm) wide tape makes the quality of each of the four channels similar to that of a quarter inch full track machine.

The built-in sync-playback amplifiers permit individual tracks to be monitored in sync with existing recordings on other tracks.

The 50 c/s version of this machine is intended for 220 V AC mains, the 60 c/s version for 117 V AC mains. The machine may be connected to other voltages by means of suitable transformers.

Please read the following instructions carefully

BEFORE SWITCHING THE MACHINE ON

It is necessary to clearly understand the overall design of the STUDER J-37 in order to obtain optimum performance in recording and reproduction, over a long period of time. By following the instructions given herein, perfect matching with other recorders will be assured, an essential pre-requisite for international Programme-Exchange.

Table of Contents

A Technical Data

Dimensions with console:	see figure 1
Weight:	app. 150 kg (330 lbs) including console
Power consumption:	220 V 50 c/s app. 500 W, other voltages and frequencies on request
Tape speeds:	15 and 7 1/2 ips. The speed switch automatically selects the appropriate amplifier characteristics
Speed stability:	± .2 % of nominal
Variation in tape speed (slip) for a change in spooling diameter from 300 to 100 mm:	less than .2 %
Wow and flutter (peak value measured with EMT 414/J 60 or EMT 420):	Unweighted: 15 ips ± .1 % / 7 1/2 ips ± .15 %; Weighted: ± .075 % / ± .1 %
Tape run out after pressing "stop" button from "playback":	less than 15 cm (6")
Stopping time from "rewind":	less than 4 seconds
Rewind time for 1000 m (3,300 ft) of standard tape:	less than 3 minutes
Tape spools:	max. 300 mm (12") Ø for 1000 m (3,300 ft) of standard tape. min. diameter 100 mm (4")
Precision timing indicator, tape driven:	99 minutes, 59 seconds, accuracy .3 %
Inputs:	.7 to 7 V via gain control, balanced, input impedance greater than 15 kΩ between 30 c/s and 15 kc/s.
Outputs:	.7 to 7 V via gain control into 200 Ω, balanced, output impedance max. 25 Ω between 30 c/s and 15 kc/s
Frequency response via tape:	at 15 ips : 30 c/s - 15 kc/s ± 2 db; at 7 1/2 ips: 40 c/s - 12 kc/s ± 2 db
Frequency response via sync-playback amplifiers:	at 15 ips : 30 c/s - 15 kc/s $^{+2}_{-3}$ db; at 7 1/2 ips: 40 c/s - 8 kc/s $^{+2}_{-3}$ db

Max. permissible phase angle between any 2 channels:	30°	
Distortion:		
a) of the amplifiers:	.1 %	
b) via tape at 1 kc/s:	2 % at 200 mM	
Signal to noise ratio, measured with noise level meter S & H Rel 3 U 33, (broadcast coding J 77) with machine running, referred to normal output level at 200 mM:	15 ips	7 1/2 ips
r.m.s.	65 (60) db	60 (56) db
r.m.s. weighted	76 (60) db	70 (56) db
peak	62 (56) db	57 (52) db
peak weighted	74 (57) db	67 (53) db

The values in brackets are measured via tape, with the machine switched into "record" and the input dummy-loaded.

When measuring noise levels, great care should be taken to avoid earth loops via the test instruments. If the plugs connect the screens of the test-leads with the "earthy" end of the amplifiers, and the test-instruments are earthed to one common point, the resulting loop-currents may affect the measurements adversely.

Signal to noise ratio, via sync-playback amplifiers, measured with noise level meter S & H Rel 3 U 33, (broadcast coding J 77) with machine running, referred to normal output level at 200 mM:	15 ips	7 1/2 ips
r.m.s.	50 db	50 db
r.m.s. weighted	60 db	66 db

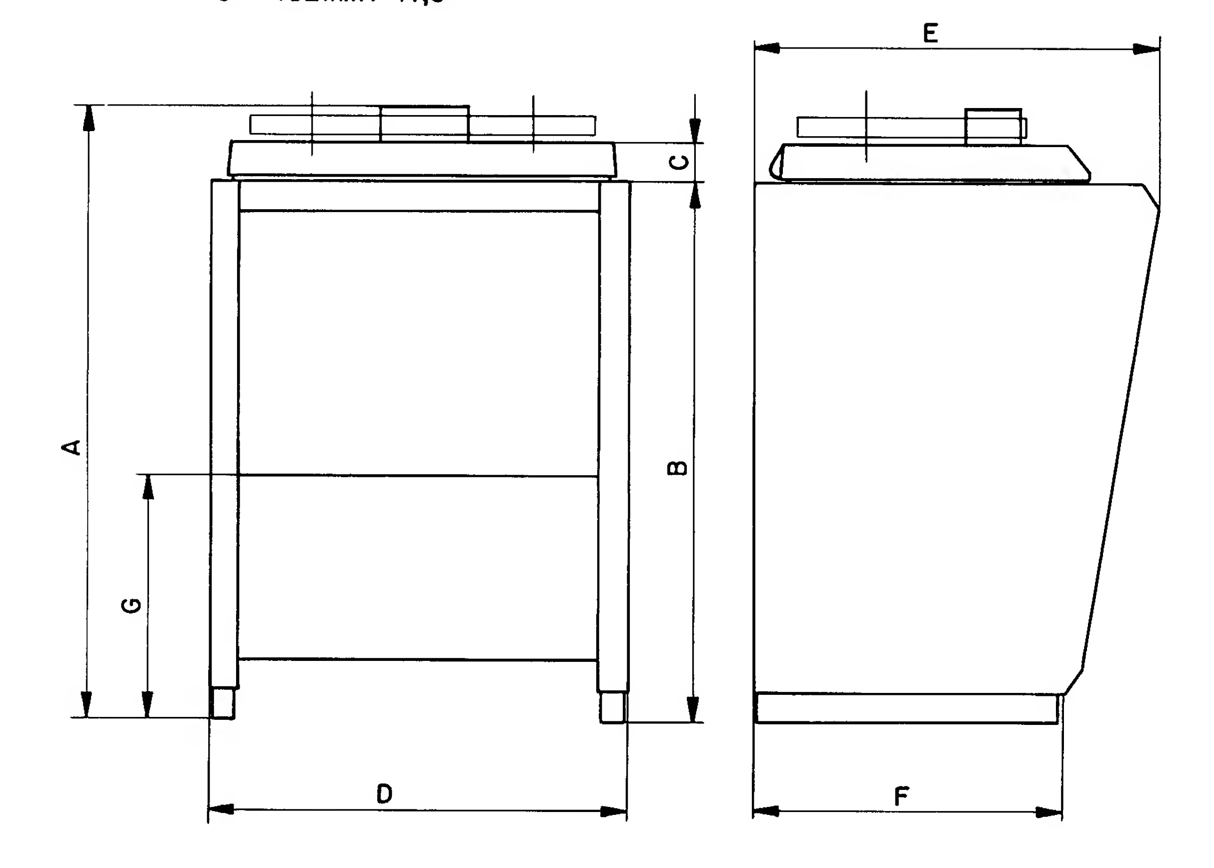
Cross-talk between two neighbouring channels at 1 kc/s:	both channels in "record"	45 db
	only one channel in "record"	50 db

Bias and erase oscillator frequency:	80 kc/s
Elapsed time indicator:	6 digits, counting only when capstan motor is running
Stray magnetic field 2 inches from contour of console:	50 mG
Erase head:	ferrite
Record and replay heads:	Vacodur (Alfenol) in all-metal head-block, giving exceptional wear resistance.

Track position :	International standard (emulsion inside)	
Track width:	4.5 mm	
Distance between tracks:	2.2 mm	
Valves and transistors:	4 record amplifiers, each	2 x E 188 CC
	4 replay amplifiers, each	3 x E 188 CC
		1 x E 283 CC
	Oscillator	6 x E 188 CC
	Sync-playback amplifiers	4 x E 188 CC
		4 x ECC 83
		4 x ECC 81
	Power supply unit	2 x E 130 L
		1 x E 283 CC
		2 x E 188 CC
		2 x 85 A 2
		2 x ASZ 18
	Power supply for sync-playback amplifiers	1 x EL 86
		1 x ECC 83
		1 x 85 A 2

DIMENSIONEN J37
DIMENSIONS

A = 1020 mm / 40,2"
B = 900 mm / 35,5"
C = 64 mm / 2,5"
D = 685 mm / 27,0"
E = 645 mm / 25,4"
F = 510 mm / 20,1"
G = 452 mm / 17,8"



GEWICHT : CA. 150 KG (INKL. KONSOLE)

WEIGHT : APPROX. 300 LBS (INCLUSIVE CONSOLE)

Fig. 1

B Operation

B 1 Brief instructions for initial operation

Unpack the machine and the accessories carefully and check against advice note.

Lift the motor-deck by depressing the recessed push-buttons on the front end of the left and right hand side of the top-plate, while exerting a slight downward pressure with the palms of both hands on the front corners of the machine. This releases the latches, allowing the deck to be lifted. Lock the deck in the open position by pressing the brace on the right hand side in.

Unfolding the sync-playback amplifiers:

B

Simultaneously press the sync-playback amplifiers towards the deck mechanism and depress the two push-buttons on the inside of the frame. Bring sync-playback amplifiers forward on their hinges. Check that all contact-strips, valves, plugs, relays and cables are properly seated and that the fuses are firmly in position.

Attention:

Make sure that the voltage and frequency of the mains corresponds with that of the recorder. (Check designation plate below the mains socket on the recorder.) In case of a different mains voltage, a transformer should be used. Connect the mains by means of the instrument mains connector. In small installations, the recorder may be earthed to the mains-earth, often the use of a special earth connection may be desirable.

The audio input and output connections are made via the Cannon plugs XLR - 3 - 11 C and XLR - 3 - 12 C. Pin 1 goes to chassis, pins 2 and 3 are the balanced input or output connections. The chassis is also connected to the negative end of the HT-line and to earth. In special cases, the HT-minus may be isolated from chassis by breaking a link in the stabilised power supply.

Because of their excellent screening properties, we recommend the use of the appropriate EMT cables for the audio connections and power supply line. Further details about the various types and their construction can be found in paragraph H and in the enclosed leaflets.

To switch the recorder on

Depress the appropriate speed-selector button 7 1/2 ips or 15 ips.

To check the fuses

Ascertain that none of the fuse pilot lamps are lighting up.

To close the recorder

The sync-playback amplifiers

Should be lifted up and pressed against the frame. Now press both push-buttons.

The Deck Plate

Should be raised slightly with the left hand and the brace released with the right hand; lower the deck-plate gently and press down with the palms of both hands. Make sure that all cables are in their proper positions and that the locking pins have locked in.

Operating Controls

The function of the individual push-buttons can be seen from figure 2. It should be noted that the speed selector buttons act as mains switch to the recorder. The mains switch, pos. 11, is generally only used for switching the machine off after duty. Button 8 is blanc and has no function.

Important !

Switching off or changing tape speed is only possible with the tape slackened. (Tape tension balance in rest position)



Fig. 2

Tape Threading

The tape path is clearly shown in figure 2. The tape adaptors should correspond to the type of tape in use. Figure 4 shows the locking bars which should be depressed in order to change the tape adaptors. Care should be taken that the adaptors are properly locked in. The same type of spool or core should be used on both sides, the minimum tape spooling diameter being 100 mm (4 inches). The tape should be wound, emulsion inside. If tape with emulsion wound outside (B-winding) is used, the tape should be re-spooled. For this purpose the tape is placed on the right hand spool according to figure 3 and wound onto the left hand spool by depressing the rewind button (arrow to the left). During this operation, the right hand spool should be braked by hand !

When threading the tape, make sure that the tape tension balance is moved from its rest position when tape tension is applied, thereby switching the capstan motor on. Compare C 3 "Tape tension balance".

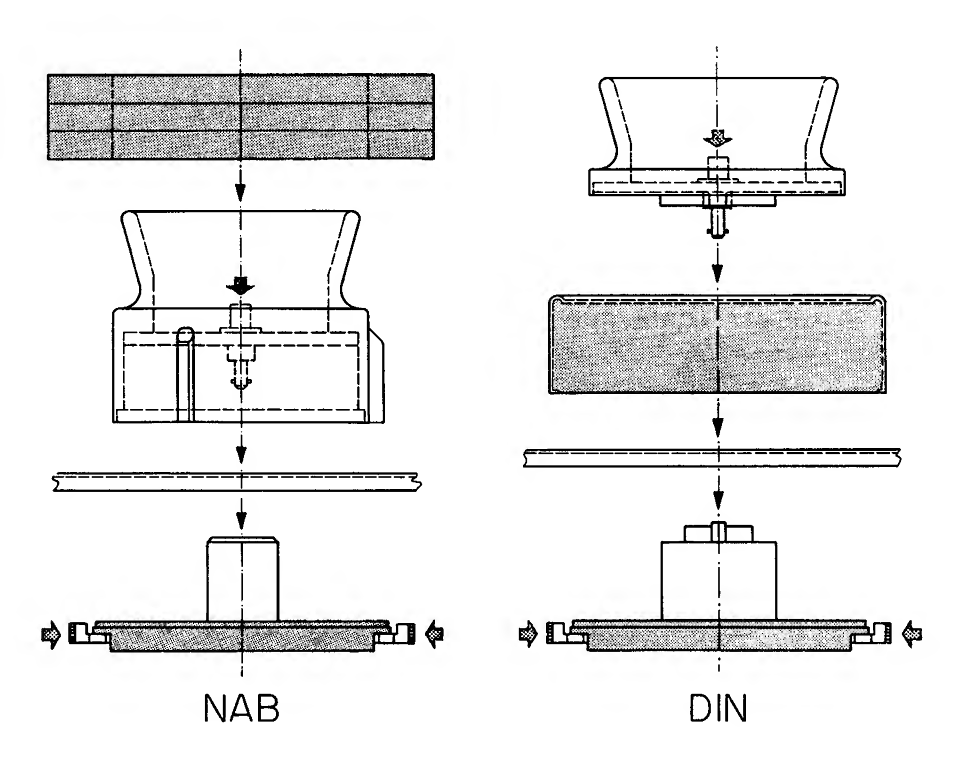


Fig. 3

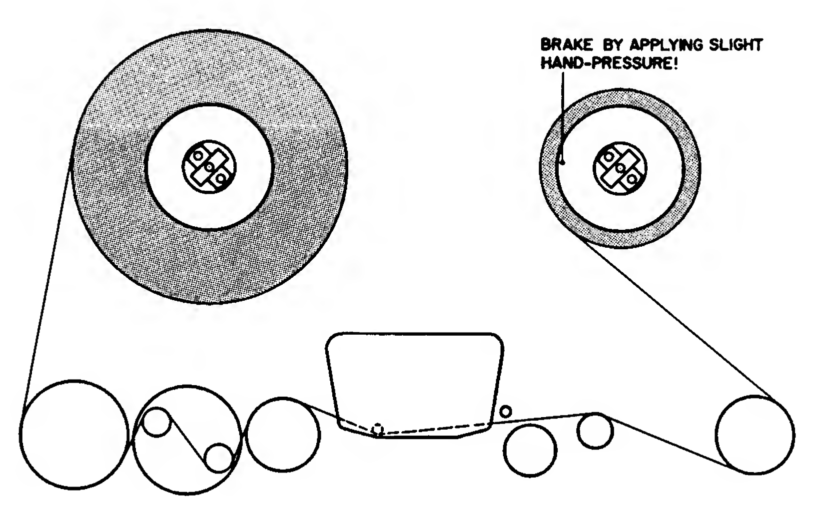


Fig. 4

B 2 Recording

The machine is switched into "record" by simultaneously depressing the play and record buttons. This simultaneous depressing of two keys is a safety interlock, to prevent accidental erasure during playback. The track on which a recording is to be made should be pre-selected by depressing the appropriate SYNC-TRACK (GUIDE-TRACK) key on the sync-playback amplifiers. It is possible to record on several tracks simultaneously. The selected track is locked during the recording.

To go into Record from Playback

One of the two following methods may be used to go into "record" from "playback" for inserting, etc. The first is to press the playback button and to hold it down. At the desired moment the record button is pressed as well and the machine is then in "record" and both buttons may be released. The second method is to lift the tape off the erase and record heads by means of the knurled wheel next to the record button. The machine can now be switched into record normally and existing recordings may be monitored via the playback head, but no erasure or recording can take place until the knurled wheel is released and the tape thereby brought into contact with the erase and record heads.

B 3 Monitoring

The signal may be monitored before or after recording. The necessary operating controls are mounted on the sync-playback amplifier panel. To monitor before recording (line in) the MONITOR-RECORD (ABHOEREN-VOR BAND) key of the appropriate channel should be pressed. To monitor after record (line out) the MONITOR-PLAY (ABHOEREN-HINTER BAND) key, should be pressed. The level can be varied by means of the volume control on the right of these keys. A HEADPHONES-MONITOR (HOERER-ABHOEREN) output is provided.

B 4 Playback

Once the machine is switched on, only the replay button needs to be pressed to go into playback. The playback key is locked during "fast-wind" and can only be operated after pressing the stop button. The playback key remains locked until the tape has come to rest to avoid any danger of tape spillage or breakage.

The "fast-forward" and "fast-rewind" buttons may be operated during playback or during recording.

A magnetic screen may be moved in front of the replay head by means of the knurled wheel on the right (Pos. 7 in fig. 2). This is to be recommended in rooms with strong stray magnetic fields as it will improve the signal-to-noise ratio. This applies particularly in rooms with 3-phase fluorescent lighting.

Existing recordings on any tracks which have not been switched into "record", can be monitored by turning the volume control on the corresponding sync-playback amplifier up. The sum-level of the channels monitored in this way can be controlled by means of the MASTER (SUMME) fader. An output socket HEADPHONES-GUIDE-TRACK (HOERER-TAKTSPUR) is provided for direct monitoring of the sync-playback on headphones.

B 5 Spooling

The push-buttons for "fast-forward" and "fast-rewind" (Pos. 1 & 2 in fig. 2) have two operating positions each. If they are depressed only halfway, they do not lock and the correspondings lights do not light up. Any desired point on the tape can be located easily by alternately depressing these two buttons halfway. The hand may be rested on the deck for this purpose. The required point may be located by means of the timing indicator. If a certain place has to be found by ear, the tape must be brought into contact with the replay head by means of the knurled wheel 6 (fig. 2) . If one of the keys is momentarily fully depressed the tape is spooled with full speed and at the same time, lifted off the heads. It is possible to go from " fast - forward " directly into " fast-rewind " but the fast wind action can only be stopped by pressing the " stop " key. In case of tape breakage or at the end of tape, the machine is switched off automatically by means of the tape tension balance.

The tape may be monitored during fast wind by operating the knurled wheel on the left (pos. 6 fig. 2). See also under C 5 "Tape lifting mechanism".

B 6 Timing Indicator

A new feature of this timing indicator is the fact that it is callibrated in minutes and seconds instead of tape footage.

at 15 ips the time can be read directly

at 7 1/2 ips the time read on the indicator should be multiplied by 2.

The programme duration is indicated with the remarkable accuracy of better than ± .3 %. This includes all errors due to different tapes, slippage, etc. This accuracy is maintained even during fast wind and makes the use of a stop-watch unnecessary in most cases.

The timing indicator counts up to 99 minutes 59 seconds and is driven by the large idler on the right hand side.

The timing indicator can be re-set to zero by means of the re-set lever which is accessible through a slot on the right hand side of the machine. The counter may be re-set while the machine is running. In order to start timing from the beginning of a recording, the re-set lever can be kept depressed on the running machine up to a given cue.

Note

For correct zeroing of the counter, the re-set lever must be depressed fully up to the click. Where several recorders are installed side by side, the re-set lever may be difficult to reach. In this case, an extension lever may be obtained as an additional extra. See C 9 "Timing Indicator".

B 7 Cutting and Editing

To facilitate editing i.e. locate a point at which the tape is to be cut, a reference line has been engraved on the right hand guide roller. The plexi-glass dial on this guide roller works in conjunction with the engraved line. The dial carries the following symbols:

playback head

record head

erase head

This enables a point on the tape which has been located in front of the replay head to be brought exactly in front of the record or erase head. This is done by turning the guide roller (without moving the tape) to align the red reference line with the symbol on the plexi-glass dial. Now the tape should be moved by hand in the appropriate direction (the guide roller should rotate in the direction of the arrow) until the reference line aligns with the symbol of the desired head.

B 8 Remote Control

Remote control operation for recording sessions. The recorder may be remote controlled by means of 5 push-buttons. A remote control unit, containing 5 push-buttons may be connected to the 11-pin amphenol connector, type 86-CP 11 on the back of the recorder. When the remote control is not in use, the dummy plug which is supplied (pins 3 and 4 are shorted together) should be inserted. The circuit diagram for the remote control is shown below.

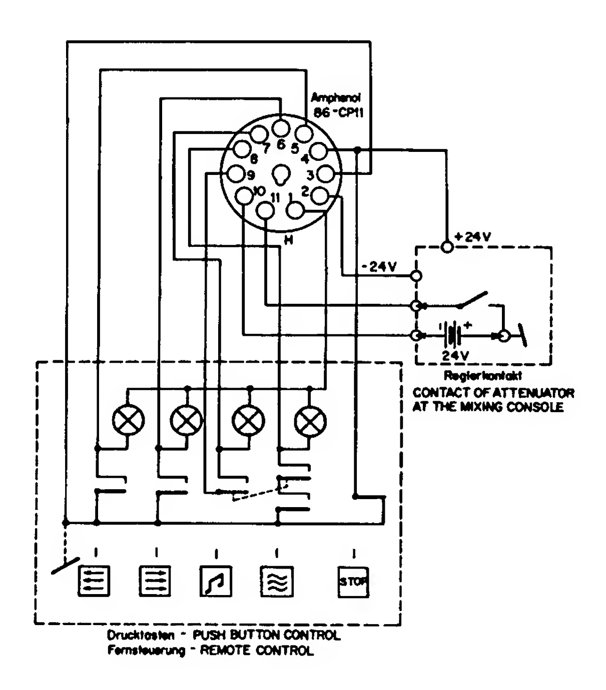


Fig. 5

Remote controlled playback

The playback mode may be remote controlled by a contact on one of the faders of the mixing desk. The contact should be open with the fader set to infinite attenuation. It switches the supply of an external 24 V source to a relay in the recorder via pins 10 and 11 (fig. 5). With this circuit the machine will start when opening the fader and stop when closing it again.

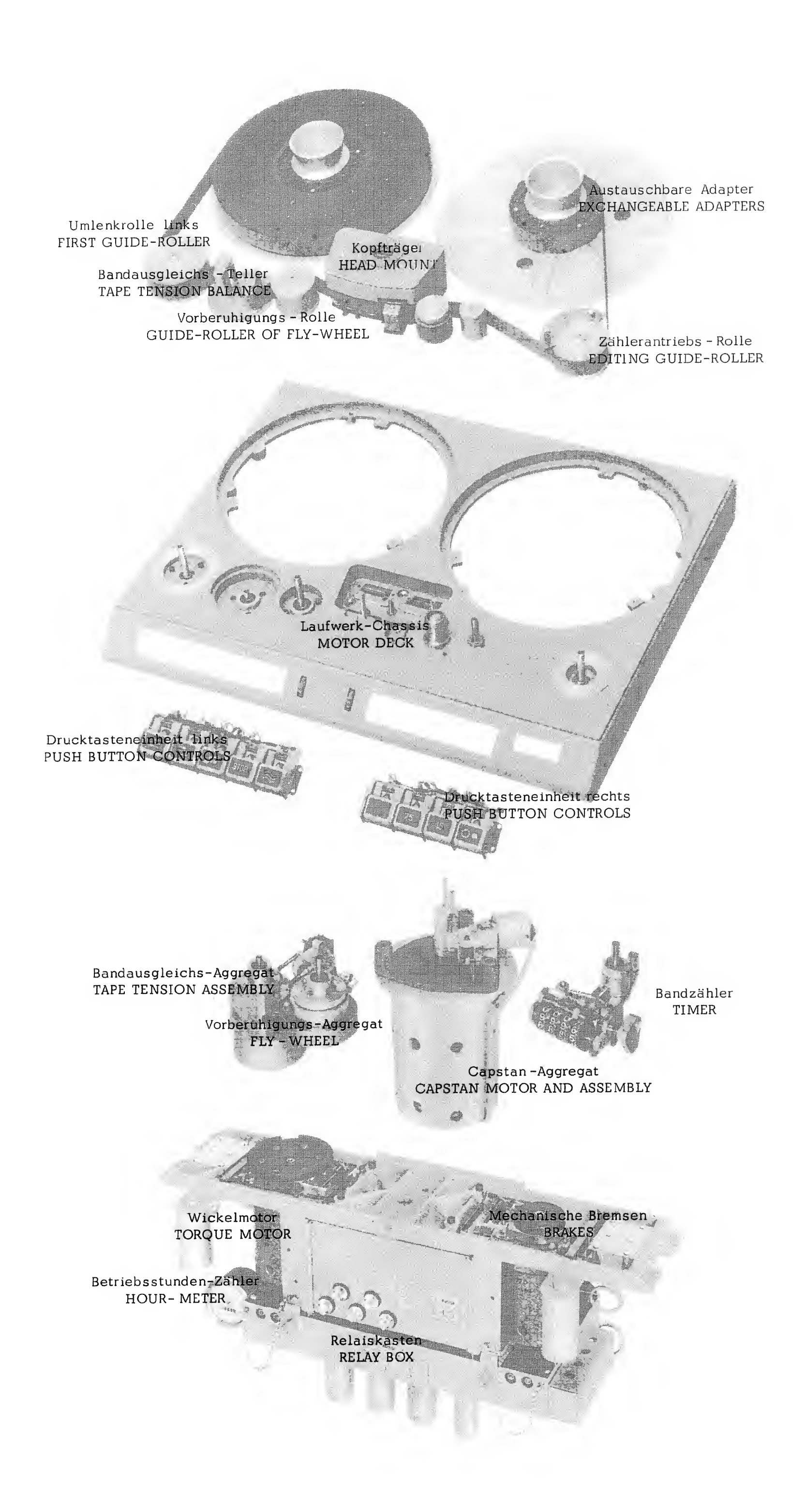
If the internal supply of the machine is to be used instead of an external 24 V source, pins 2 and 10 should be linked, and the fader contact connected to pins 3 and 11.

The mode of operation can be monitored by means of suitable pilot lamps.

Studer J 37



The Main Parts and Assemblies



C Tape Transport

The preferred operating position for the tape transport mechanism is horizontal. However, it can also be mounted in a sloping position with the rear raised but the angle should not be greater than 30°.

The recorder remains fully operational with the tape deck opened. In this position the pinch-wheel will drop by its own weight against the capstan shaft. This will cause a slight tension on the threaded tape if the capstan motor is running. However, wow and flutter measurements should not be taken with the tape-deck opened.

All sub-assemblies are equipped with plugs and sockets. Consequently, they can be replaced in the minimum of time, by undoing a few screws.

The very low wow and flutter figures of the STUDER J-37 are due to a number of features of the tape transport. The small distances between the tape driven idler and the heads, and between the heads and the capstan, help to prevent undesirable longitudinal oscillations in the tape and bring the resonance frequency well above the audible range. It was therefore possible to omit any tape driven idlers between the heads, which might have undesirable side-effects.

C 1 Head Block

The removable head block has a cast aluminium housing. The high impedance heads are mounted in this casting in such a way that adjusting around their three axes is possible. To maintain even wear, the head faces are approx. 1/10 mm (.004") narrower than the tape. The dimensions of the heads and the screening are chosen so as to maintain a good low frequency response. The record and replay heads are mounted in μ-metal screening cans to prevent pick-up of stray magnetic fields. The tape enters and leaves the head-block via tape guides. The guides are made of a very hard and wear-resistant metal. The inner clearance of these guides is 1" (25.4 mm) which corresponds to the nominal tape width.

The small distances between the stabilising idler, the heads, and the capstan ensure exceptionally low flutter figures.

The connections from the head block to the recorder are made via TUCHEL contact strips which are well screened inside the head-block.

To remove the head-block cover plate, a coin or screwdriver should be inserted into the slot on the rear of the head-block and given a slight twist. This gives access to the three screws which hold the head-block to the recorder. The head-block can be removed by undoing these three screws.

The heads are fixed to the head-block by means of 4 screws.

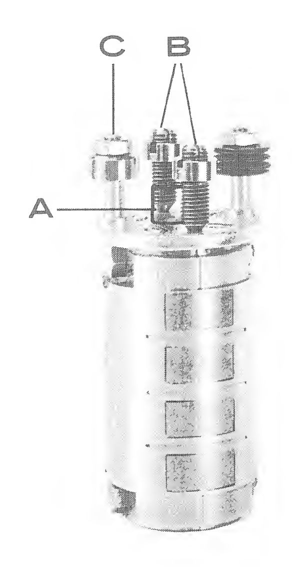


Fig. 6

The function of these screws is as follows: -

Pos. A. The nut in the centre of the head marked "A" in figure 6 secures the erase head to its adjustable base plate.

Pos. B. The two screws "B" serve to align the angle of the head face to the plane of the tape. The one in front serves to adjust the height, the one at the back to set the vertical.

Pos. C. The nut "C", is for adjusting the azimuth. The procedure for setting up azimuth is described in section "E" "Alignment Procedures".

Caution:

The machine must be switched off before removing the head-block to avoid accidental magnetization of the heads. After changing the head-block or individual heads, it is advisable to de-magnetize them carefully by means of a de-magnetizing coil (de-fluxer).

C 2 Spooling Motors and Brakes

The powerful spooling motors are of the "inside-out" construction and produce an even torque, free of pole flutter. The shaft of each spooling motor carries a brake drum and the base for the various reel and coil adaptors. The height of the spooling plates can be adjusted by a vertical movement of the brake drums on the motor shaft. Should such an alignment become necessary, proceed as follows:

Remove the spooling-plate and the underlying dust cover, which is held by three screws. Two grub-screws can now be reached from the side, just below the black anodized adaptor-base. After loosening the two grub-screws, brake drum and adaptor-base can be adjusted to the desired height.

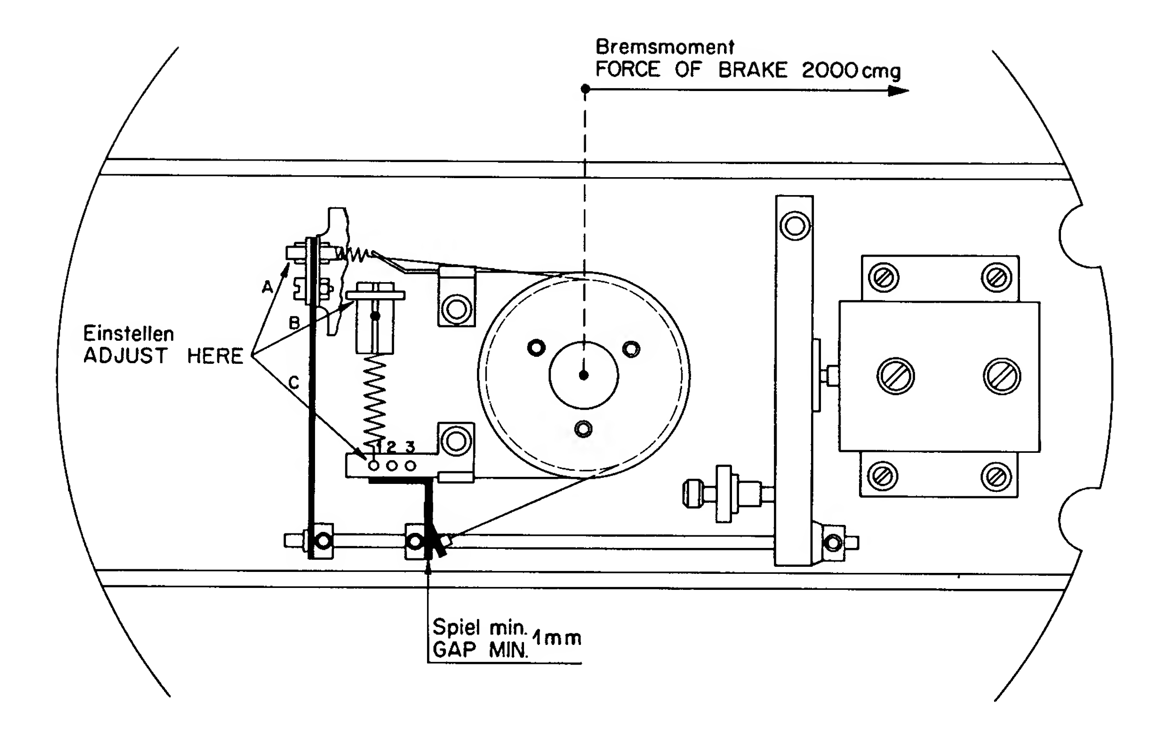


Fig. 7

The STUDER J-37 Magnetic Tape Recorder has three independent brake systems. During normal operation, the braking (back tension) is purely electrical, by means of a suitable torque of the take-off motor. The magnitude of this torque is controlled by the tape tension balance via a magnetic amplifier. As this ensures constant tape tension throughout the reel, its absolute value can be held low, thereby reducing wear on tapes and heads. The mechanical brakes serve only for holding the turntables when the machine is stopped. The brake bands are made of stainless steel. The brake lining is made of woven nylon which maintains its characteristics over long periods of time. The wear is very slight because the brakes only provide a very small braking torque.

Brake tension is adjusted with no power to the spooling motors:

1. Remove turntable and underlying dust cover. You will see now the brake facilities as shown in fig. 7.

2. Insert NAB adapter and place a NAB Reel with a few feet of tape on the adapter shaft.

3. Attach a spring scale to the end of the tape.

4. When pulling the spring-scale in the normal tape direction, a reading of 14 ounces (ap. 400 gr) should be obtained. The corresponding torque is 5 cm x 400 gr = 2000 cmg.

5. Coarse adjustment can be made by connecting the spiral spring to one of the three holes as shown in fig. 7. For fine-adjustment the knurled nut B (fig. 7) needs to be turned.

6. Turn the NAB reel so that the brake drum rotates in the contrary direction when, pulling the spring-scale.

7. Brake tension in correct, when a reading of 1,5 ounces (45 gr) is obtained. The corresponding torque is 5 cm x 45 gr = 225 cmg. Adjust with alignment screw A in fig. 7.

8. Repeat both adjustments alternately, until optimum results are achieved. The ratio 1 : 8 of both braking torques is accessible by means of a servocord which is fastend at the black indicated lever (in fig. 7).

When the stop key is pressed, electrical as well as mechanical braking is applied. By means of a relay, DC is injected for a short time into both spooling motors, the braking torque is about four times greater in the motor acting as take-off motor than in the one acting as take-up motor. This ensures rapid braking without spillage.

For cuing the tape the fast wind keys may be depressed halfway separately or together and held in this position as long as necessary. (The second key will act as a brake) When the keys are released the tape will stop. To avoid depressing the keys too far, the hand may be rested on the deck-plate. For fast forward and rewind, the appropriate key should be depressed fully and released at once.

The machine can then only be stopped by operating the stop button.

If a long length of tape is being rewound, a very high winding speed may be reached and the tape may be slowed down by depressing the fast wind key in the opposite direction and brought almost to a stand-still before operating the stop button. In this way, it is possible to avoid tape spill even under the most extreme conditions. This method also helps to avoid damaging the tape ends when fully rewinding a tape. A smooth stop can be achieved even with very little experience.

During fast wind, the tape is lifted off the heads to avoid head wear by means of the tape lifting mechanism. See C 5 "Tape Lifting Mechanism". The tape may, however, be monitored during fast wind for short periods, by operating the knurled wheel on the left. (Pos. 6 fig. 2)

C 3 Tape Tension Balance

A special feature of all STUDER 37 tape recorders, is the tape tension balance. Its purpose is to keep the tape tension across the heads, which is very critical, constant during "record" and "replay" for all spooling diameters that are likely to occur in practice. It helps to smooth out any jerks that might be caused by bad splices in the tape. At the end of tape, or if the tape breaks, the tape tension balance returns to its rest position and performs the function of the stop key. It also switches the capstan motor on and off.

After threading the tape, a slight pull on the tape will bring the tape tension balance into its working position, thereby switching the capstan motor on. The record or replay keys should not be pressed until the capstan motor has had time to run up to speed (app. 10 sec.).

The balance is sensitive to the tape tension and operates a stud-potentiometer. This potentiometer controls the braking torque in the take-off motor via a magnetic amplifier. As the tape tension balance maintains a very constant tape tension, its absolute value can be kept comparatively low. This results in a great saving of head and tape wear. The normal operating tension during "record" or "replay" is app. 170 g (6 ozs) before the heads.

To facilitate cutting and editing, the tape tension balance can be locked by turning it in an anticlockwise direction. This removes any "give" from the tape path. Except for the operating mode "cueing" the tape tension balance is automatically returned to its operating position when the machine is started. However, if a quick and clean start is essential, the tape tension balance should be returned to its normal operating position by hand before pressing the record or replay key.

If the end of tape switch is not operating properly, it can be adjusted - after loosening the grubscrew - by slightly rotating the potenticmeter nousing. With the tension balance at rest, the potentiometer wiper should be on the first stud. In this position it should be possible to operate the tape speed selector keys i.e. they should not be electrically locked. The adjusting screw of the double-draw spring is set correctly when the end of tape switch operates as soon as the tension balance returns to rest. The switch should not operate, however, when the tape is threaded, regardless of the mode of operation.

A dashpot connected to the tape tension balance serves to damp any mechanical oscillations. The red knurled wheel on the left of the dashpot permits adjustment of the degree of damping. The adjustment is carried out by aligning two holes at the bottom of the cylinder to a greater or lesser degree. This is a very delicate operation and the disc should be turned by small fractions only.

When removing or fitting the tape tension balance, proceed as follows:

a. Remove electrical connections.

b. Release locknut and unscrew piston rod (normal right hand thread). Avoid bending the coupling spring.

c. Undo the screw in the centre of the tension balance and carefully pull the disc off the shaft.

d. The entire unit may now be withdrawn by undoing the three fixing screws.

Attention !

The tape tension balance is a delicate piece of precision engineering and should be handled accordingly.

C 4 Stabilising Idler

The idler wheel is situated between the tape tension balance and the head-block. It is coupled to a large fly-wheel underneath the deck-plate with a taper fit. During fast wind and in the stop position, the fly-wheel is magnetically de-coupled. It is only driven via the taper during "record" and "playback". This avoids tape damage due to excessive strain. When the deck mechanism is propped up, the coupling of the fly-wheel is not reliable. Therefore, no wow and flutter measurements should be taken in this position. The fly-wheel should not be allowed to rub on anything, in particular cables that may have slipped out of position. A slight rattle of the fly-wheel during switching is of no consequence.

C 5 Tape Lift Mechanism

The tape lifting lever is situated between the erase head and the record head. It is actuated by two electro-magnets and has two operating positions:

1. During fast wind (high speed and reduced speed), the tape is lifted off all the heads.
2. In the stop position, the tape remains in contact with the heads and can therefore be monitored. Monitoring during fast wind is possible by operating the left hand knurled wheel.

In order to bring the tape into contact with the heads gently, the return of the tape lifting lever is delayed by means of a dash-pot. The degree of damping can be adjusted by means of the red knurled wheel at the back of the dash-pot cylinder. Two small holes can be opened more or less by turning the wheel, thus altering the damping the the cylinder. This wheel, however, should only be turned by a few degrees.

Furthermore, the distance of the tape from the replay head in the half lifted position (monitoring during fast wind) can be adjusted. A tape with a 1 kc/s tone should be used for this purpose. First loosen the lock nut on the connecting rod of the right hand solenoid of the tape lift mechanism. Switch into playback and turn the hexagonal section of the solenoid-end of the rod so that the tape just remains in contact with the head, when the left hand knurled wheel is operated.

C 6 Capstan Assembly

The tape is driven by the capstan which is connected to the 6 / 12 pole hysterisis synchronous motor without intermediate gearing. The two tape speeds are achieved by switching the poles of the motor. A heavy fly-wheel on the capstan is linked to the capstan motor by means of an elastic coupling.

Mounted on the same frame, which holds the capstan and the drive motor, is the capstan pinch - roller with its swivel arm and solenoid. The pinch-roller pressure can be adjusted while the machine is running through a small opening in the deck.

For measuring the pinch-roller pressure, the fuse S 2 should be removed in order to break the capstan motor circuit. The "playback" button should now be pressed and before making any adjustments, it should be ascertained that the solenoid has pulled right in, so that the pinch-roller pressure is controlled by the spring only and not by the solenoid. A spring-scale can now be attached between the rubber wheel and its cover-plate. The pressure should be approximately 1,800 g (4 lbs).

To remove or replace the pinch-wheel, unscrew the aluminium cover-plate, and simply lift it off.

Important !

The above-mentioned rubber wheel consists in the case of the J 37, of two half-inch wheels, which should not be turned over nor swapped against one another, i.e. the upper wheel should not be mounted in place of the lower one or vice versa because the wheels are ground with a slight taper

If everything is correctly adjusted, the tape will not rub against the upper or lower edge of the tape guide on the head-block (beside the capstan).

If necessary, the entire capstan assembly may be removed. The procedure is as follows : -

a. Pull rubber pinch-roller after removing its mounting screw.

b. Undo the fixing screw and pull pinch-wheel bearing off.

c. Disconnect the motor cable.

d. Undo the three screws which hold the capstan assembly to the deck-plate, at the same time supporting the capstan assembly from underneath. When lowering and removing the capstan assembly, care should be taken that the capstan is not damaged.

If necessary, the capstan itself may be replaced. It runs in two special precision sleeve bearings and as the fit is very critical, it should be dismantled complete with its bearings, and replaced by an appropriate precision-ground and tested spare.

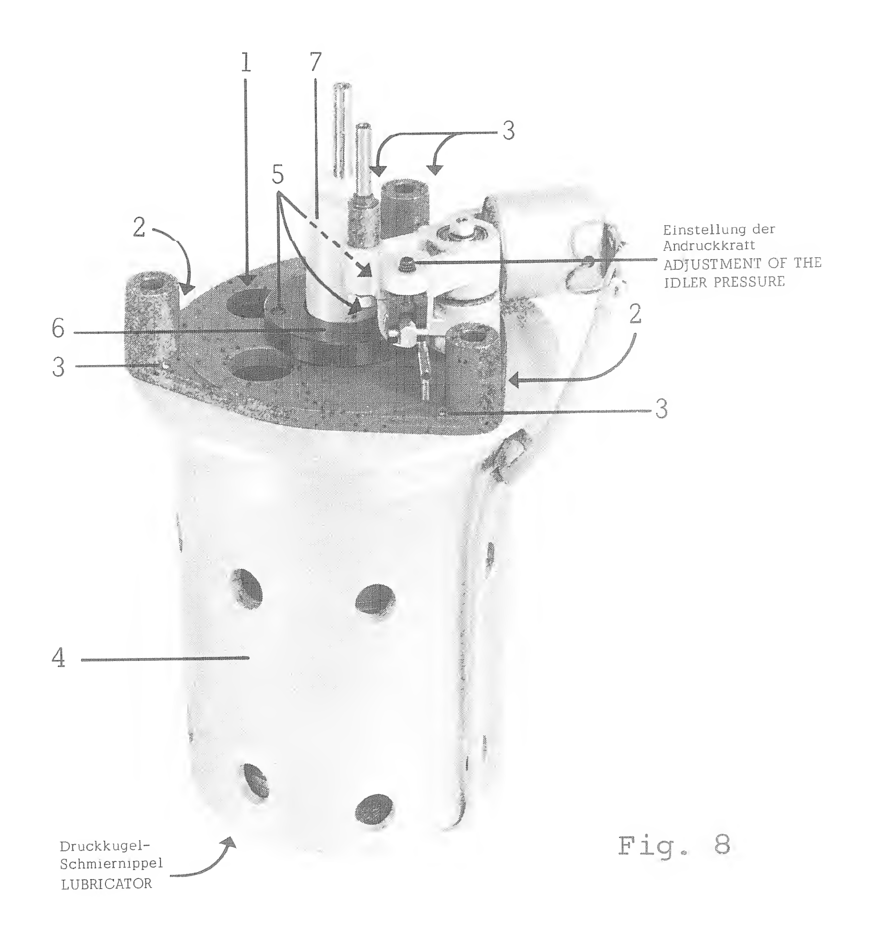


Fig. 8

Dismantling the capstan assembly.

a. Remove the two M 3 fixing screws of the rubber coupling through one of the two holes (1 in fig. 8) in the bearing flange. (The screw heads can be aligned with the holes by turning the capstan).

b. Knock the two taper pins (2 in fig. 8, beside the casting marks) out by means of a suitable punch from the bearing-flange-side.

c. Unsolder the connections to the pinch-wheel solenoid.

d. Remove the four M 4 allen-screws (3 in fig. 8) on the underneath side of the flange of the motor screening case. Next, remove the capstan assembly with bearing flange and fly-wheel from the motor-housing (4), being careful to keep it in line.

e. Remove the slotted M 8 nut at the lower end of the capstan and withdraw fly-wheel.

f. Remove the M 5 allen screws (5 in fig. 8) from the underneath side of the bearing flange, and remove the fixing ring (6 in fig. 8) and the capstan bearing (7 in fig. 8)

g. Fit spares and re-assemble in reverse order. Finally re-fix the two rubber couplings by means of the M 3 screws. (see under a)

Important !

The four M 4 allen screws (3 in fig. 8) should not be tightened until the two taper locating pins (2 in fig. 8) have been fitted.

Do not check the eccentricity of the capstan without pinch-wheel pressure applied, as bearing play may cause erroneous readings.

C 7 Power Supply for Tape Transport Mechanism

The power for the tape transport mechanism and the tape tension control circuits is supplied by a separate mains unit, which is mounted in the centre of the cross-member carrying the spooling motors. See fig.: "Tape Transport Mechanism".

To gain access to the fixing screws of this mains-unit, the spooling-plates and underlying dust covers have to be removed.

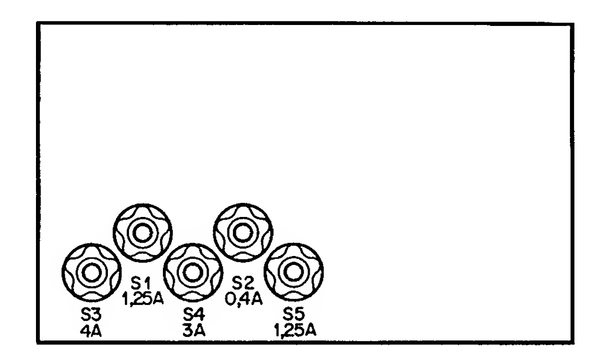


Fig. 9

The power supply unit can be withdrawn from the machine after releasing the safety-chains and swinging the relay-box down on its hinges. All inter-connecting cables have to be unplugged. This supply unit contains the following fuses (220 V model):

S 1 = 1.25 Amp. black, main fuse, transport mechanism

S 2 = .4 Amp. black, capstan motor

S 3 = 4 Amp. blue, relay rectifier (in AC input circuit)

S 4 = 3 Amp. white, rectifier for DC breaking current, (in AC input circuit)

S 5 = 1.25 Amp. black, spooling motor

In the 117 V model, fuse S 1 has a rating of 2.5 Amp.
All fuses are of the same dimensions (5 x 20 mm) and they are of the "slo-blo" type.

Caution

When replacing a burnt fuse, special attention must be paid to the colour marking on the fuse holder and associated cap.

A neon or filament indicator bulb is contained in each fuse cap to facilitate the finding of a blown fuse. These indicators are designed to work on a specific voltage and it is important to replace them according to their colour markings. When a fuse blows, the associated bulb lights up, and in case of trouble, a faulty fuse can be located at one glance.

C 8 Relay Box

The relay box contains the control circuits for the various modes of operation. It is mounted just below the tape transport power supply. A printed circuit board mounted on hinges, carries nine plug-in relays type Siemens 154 d / 93 n. Twelve plug-in power relays type SCHRACK, have their sockets on the underside of the relay box. Silicon diodes are used on all relay windings for click suppression. The relay box also carries the sockets for the interconnecting cables to the various sub-assemblies of the recorder.

A resistor (270 Ω / 40 W) is mounted on the right hand side of the relay box.

Four potentiometers P 1 to P 4 are mounted on the front-side of the relay-box and these are for adjusting the starting and braking characteristics of the recorder. Each potentiometer shaft is secured by a lock-nut to avoid accidental alteration of its setting.

The functions of these potentiometers are as follows:

1. Start

When the "playback" button is pressed, the mechanical brakes are released at once and 220 V are applied to the take-up motor in order to accelerate the tape as quickly as possible. After a small delay, the pinch-roller is pulled in and this should happen ideally when the tape has reached its nominal speed. This delay can be adjusted by means of the potentiometer P 1. The best compromise will be achieved if the potentiometer is adjusted in the following manner:

> Place a thousand meters (app. 3,300 ft) of tape onto the left hand spooling-plate and wind forward until the spooling diameter on the take-up spool is 150 mm (6 inches). When pressing the playback button, no loop should be thrown between the capstan and the drive-pulley of the timing indicator. The potentiometer P 1 should be turned clockwise until this is just achieved. During this adjustment, the potentiometer P 2 should be opened about 90° (clockwise).

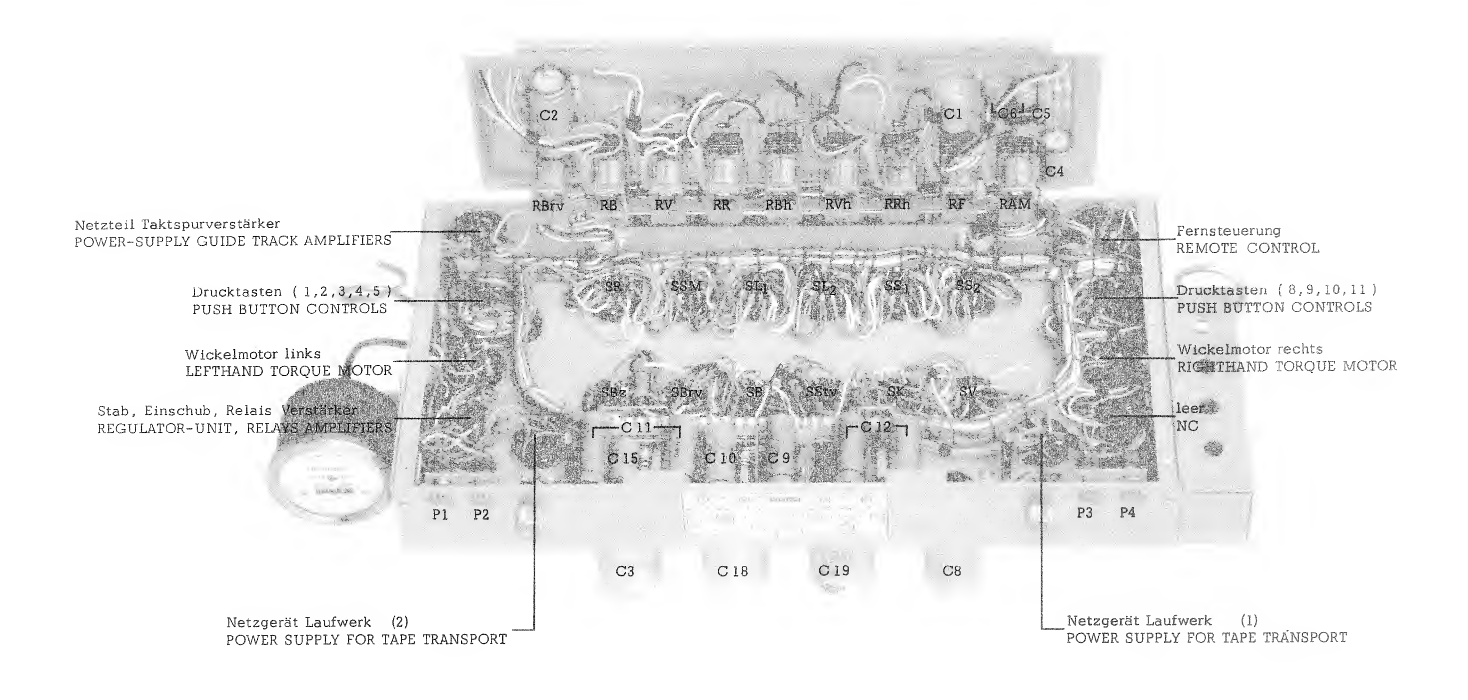
After a short time the take-up motor should be switched back to its normal operating voltage. For this purpose, the contact which was short-circuiting the resistor R 270 Ω / 40 W, which is in series with the take-up motor, is opened. The delay-time before this contact is opened is adjusted by means of the potentiometer P 2. This should be set up as follows:

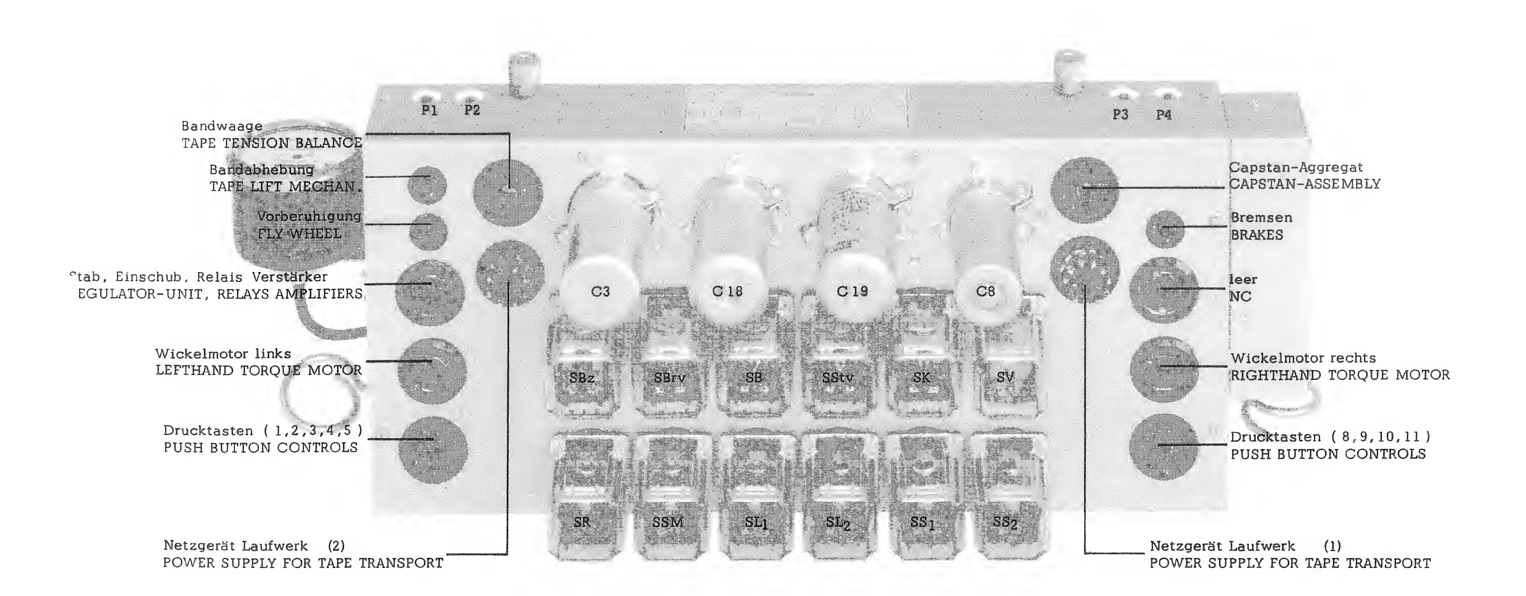
> The thousand meter (approx. 3,300 ft) tape should be wound on until the remaining spooling diameter on the left hand spool is down to 150 mm (6 inches). When pressing the playback button no loop should appear between the capstan and the pulley of the timing indicator. At the same time, the dash-pot of the tape tension balance should be adjusted (see also under C 3 "Tape Tension Balance") so as to give critical damping.

These two adjustments are somewhat inter-dependent and should be repeated two or three times until optimum results are achieved.

2. Brakes

The braking (see also under C 2 "Spooling Motors and Brakes") is effected by applying a large DC braking current to the spooling motors for a short time. The length of time during which this braking current is applied, when the machine is stopped from the "playback" or "record" modes, can be adjusted by means of the potentiometer P 3. The length of the braking time is approximately half a second. The setting is right if the tape lift mechanism holds the tape away from the heads


C2
C1
C6
C5
C4
RBrv
RB
RV
RR
RBh
RVh
RRh
RF
RAM
Netzteil Taktspurverstärker
POWER-SUPPLY GUIDE TRACK AMPLIFIERS
Fernsteuerung
REMOTE CONTROL
Drucktasten (1,2,3,4,5)
PUSH BUTTON CONTROLS
SR
SSM
SL1
SL2
SS1
SS2
Drucktasten (8,9,10,11)
PUSH BUTTON CONTROLS
Wickelmotor links
LEFTHAND TORQUE MOTOR
Wickelmotor rechts
RIGHTHAND TORQUE MOTOR
Stab, Einschub, Relais Verstärker
REGULATOR-UNIT, RELAYS AMPLIFIERS
SBz
SBrv
SB
SStv
SK
SV
leer
NC
C 11
C 15
C 10
C 9
C 12
P1
P2
P3
P4
C3
C 18
C 19
C8
Netzgerät Laufwerk (2)
POWER SUPPLY FOR TAPE TRANSPORT
Netzgerät Laufwerk (1)
POWER SUPPLY FOR TAPE TRANSPORT


P1
P2
P3
P4
Bandwaage
TAPE TENSION BALANCE
Bandabhebung
TAPE LIFT MECHAN.
Vorberuhigung
FLY WHEEL
Capstan-Aggregat
CAPSTAN-ASSEMBLY
Bremsen
BRAKES
Stab, Einschub, Relais Verstärker
REGULATOR-UNIT, RELAYS AMPLIFIERS
leer
NC
C3
C 18
C 19
C8
Wickelmotor links
LEFTHAND TORQUE MOTOR
Wickelmotor rechts
RIGHTHAND TORQUE MOTOR
SBz
SBrv
SB
SStv
SK
SV
Drucktasten (1,2,3,4,5)
PUSH BUTTON CONTROLS
Drucktasten (8,9,10,11)
PUSH BUTTON CONTROLS
SR
SSM
SL1
SL2
SS1
SS2
Netzgerät Laufwerk (2)
POWER SUPPLY FOR TAPE TRANSPORT
Netzgerät Laufwerk (1)
POWER SUPPLY FOR TAPE TRANSPORT

until the tape has stopped, but not longer.

The potentiometer P4 has the same function, but when stopping out of "fast-wind". The braking time should be adjusted so that the tape comes into contact with the heads immediately after the tape has come to rest. This should be set when stopping the machine from the maximum fast-wind speed. This stopping time is about three seconds, during which the "playback" key remains locked to avoid spilling or breaking the tape. The braking time and the timing of the tape lift mechanism are coupled together.

C 9 Timing Indicator

This precision timing indicator should not be lubricated or, if necessary, a fine acid-free watch-oil should be applied carefully and sparingly. If the recorder is operated in dusty surroundings, it might become necessary after a long period of operation to clean the timing indicator with alcohol and to re-grease it sparingly. The timing indicator may be removed by undoing its three mounting screws, access to which can be gained after the plexi-glass dial over the guide roller, and the guide roller itself, have been removed. When removing and re-fitting the timing indicator, the washers which control the height, must be replaced correctly.

If several recorders are to be installed side by side, the reset-lever of the timing indicator will be difficult to reach. For such cases, an extension re-set lever can be supplied.

C 10 Guide Rollers

The two guide rollers which have not been mentioned so far, (one on the extreme left and one to the right of the capstan) have self-lubricating ball-bearings which normally do not require any attention.

C 11 Console

The console is made of wood and covered with a synthetic fabric. The sync-playback amplifiers are mounted on the front panel of the console. This panel is mounted on hinges and can be swiveled forward for servicing.

D Electronic Assemblies

The electronics, each forming a complete sub-unit, lie neatly in the lower portion of the angle iron frame. They are the record and replay amplifiers, the oscillator and the amplifier power supply unit which is in two sections. All these units are equipped with contact strips and can be removed by pressing the red locking key and pulling the unit forward. When replacing an amplifier, it locks in automatically. During these operations, the recorder should be switched off to avoid magnetising the heads, due to transient pulses. The various amplifiers, etc., are inter-connected by means of a cable former. See circuit diagram 7.837.380.

The amplifiers are equipped with triodes throughout, and large amounts of negative feed-back make the circuits virtually independent of valve characteristics.

To enable the units to be serviced or tested outside the recorder, two adaptor cables are available. They can be supplied upon request. The following descriptions refer to one channel. The four channels are identical.

D

D 1 Record Amplifier

The input connector to the record amplifier is located at the rear of the machine. The wiring layout is neat and clear. The input goes from the input connector via a balanced 1 : 1 transformer to the four - stage amplifier. The two 100 KΩ potentiometers P 1 and P 2, permit independent gain control for the two tape speeds. They are switched by means of a relay (RLA, contacts 9/10 and 15/16) which is operated by the speed selector switch. Following the two stages of amplification in the double-triode V 1 (E 188 CC), is a frequency selective RC network which provides the necessary recording pre-emphasis at the high frequencies. Two trimmers C 6 and C 7 permit the correct pre-emphasis setting for two speeds and they are switched into circuit by means of the relay RLA, contact 5/6 and 11/12.

The last two stages are provided by the double-triode V 2 (E 188 CC). The anode circuit of the output triode contains a choke 1.337.568. The output is taken via the DC blocking condenser C 11 to the bias trap 1.337.582, which is tuned to the oscillator frequency (app. 80 kc/s), and from there the audio signal is taken on to the oscillator unit which mixes the audio signal with the HF-bias.

The record amplifier is designed so as to give an overload margin of approximately 15 db. This enables the use of special tapes such as PER 555. Regarding full-modulation and the necessary compromise between distortion and signal-to-noise ratio, see under E "Alignment and Testing" and E 2e "Distortion Measurements".

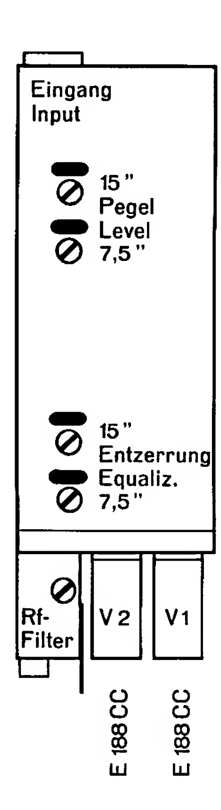


Fig. 10

D 2 Oscillator

The high frequency of approximately 80 kc/s for erase and bias currents is produced by a very stable and symmetrical push-pull circuit using two double triodes E 188 CC (V 3 and V 6). The oscillator coil, the feed back coil and the output winding for the erase current are wound on a ferrite core 1.337.764. The erase heads are fed directly from the secondary winding of the Transformer (which forms the inductance of the tuned circuit) via the contacts of the relays RA 1, RA 2, RA 3 and RA 4.

An inductance D (1, 2, 3, 4) is switched as dummy-erase-head into circuit by the contacts of the appropriate relay RA (1, 2, 3, 4) for any channel that is not switched into "record". This coil D is made to have the same inductance and Q-factor as the corresponding erase head. (This adjustment is made in the factory). This prevents sudden changes in level and achieves a constant loading of the oscillator regardless of the number of channels which are being switched into "record".

In order to achieve the best possible signal-to-noise ratio, the bias current for the record head is not taken directly from the oscillator. Instead, the bias for each head, passes through a separate push-pull stage with a tuned-plate circuit, which reduces the harmonic distortion of the high frequency bias to a value well below the level which could cause any hiss.

These tuned RF-stages make it possible to dispense with the usual bias symmetry adjustment which tends to be unstable and would need to be re-set from time to time.

Any tape noise in excess of the inherant tape noise can only be caused by DC-magnetisation of

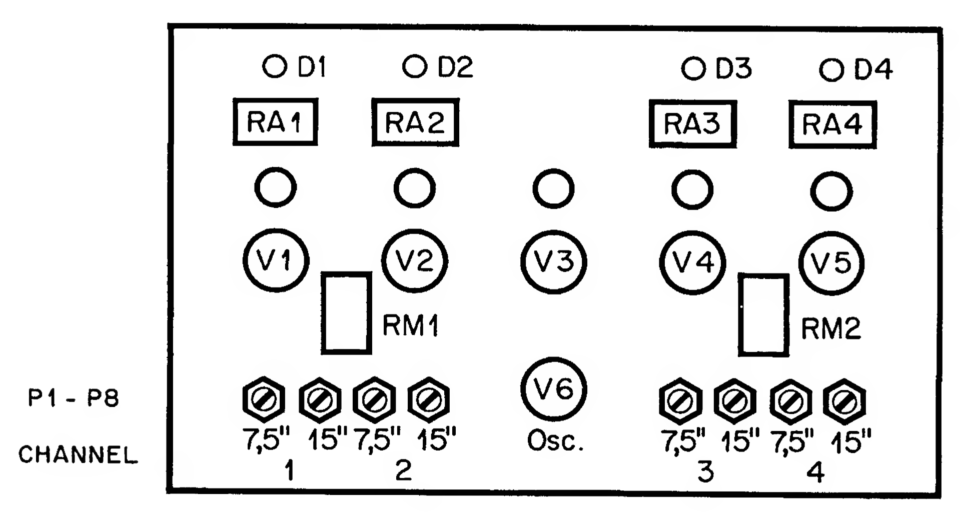


Fig. 11

the heads or parts in the tape path or the tape itself. If the noise figures as specified for the particular tape are not achieved, all the parts which could be suspected should be carefully demagnetised.

The bias current is adjusted separately for each channel and for each speed by means of eight potentiometers (P 1 - 8). The necessary bias currents depend on the type of tape in use. Further details about the setting up of bias can be found under E 2b "Bias Adjustment" and E 2e "Dis-

tortion Measurements". The relays RL_1 and RL_2 switch the bias current according to the selected tape speed.

To enable a recording to be made in sync with one or more existing tracks, the record heads are connected via the contacts of the relays RA 1, RA 2, RA 3 and RA 4 to the inputs of the corresponding sync-playback amplifiers. For this purpose the record head is being used as a replay head and the frequency correction networks are contained in the corresponding sync-playback amplifier. When the "record" selector key of any channel is pressed, the appropriate relay RA (1, 2, 3, 4) switches the record head to the corresponding bias supply and recording amplifier (see circuit diagram 7.837.500 oscillator), at the same time the corresponding sync-playback amplifier is short-circuited. During recording these keys are electrically locked and the channels cannot be switched in or out of "record".

D 3 Playback-Amplifier

The playback amplifier consists of a three-stage voltage amplifier with a large amount of negative feed-back followed by a phase splitstage and a push-pull output. By using the first two stages V 1.1 and V 2.1 in a cascode circuit and by using DC heating, an excellent signal-to-noise ratio is obtained. The third stage is a cathode follower to provide the necessary low impedance source for the feed-back loop which contains the RC networks for the playback frequency corrections.

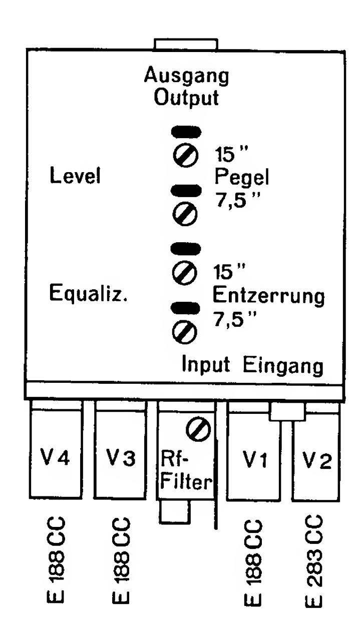


Fig. 12

The equalisation is switched automatically by means of the plug-in relay RLW (contact 15/16).

A RF trap, tuned to the bias frequency of 80 kc/s and an RC-network with the trimmer C 14 and C 15 to correct for the gap losses of the head lie between the third stage and the pre-set gain controls P 1 and P 2. The switching according to the selected tape speed is effected by the relay RLW (contacts 7/8 and 13/14). The subsequent push-pull output stage can provide a high

output voltage at a low internal output impedance. The output socket which follows the output transformer is mounted on the back of the playback amplifier.

For all adjustments on the playback amplifier, see under E 1 "Playback-Amplifier Alignment".

D 4 Amplifier Power Supply Unit

The amplifier supply unit consists of two plug-in units and supplies all the amplifiers including the oscillator. The HT-voltage is electronically stabilized to ensure high stability of performance of the amplifiers and oscillator over long periods of time.

D 4a Amplifier Mains Section

The two mains transformers cause very little stray magnetic fields due to the use of special C-cores. They provide all the operating voltages for the record and replay amplifiers as well as the oscillator. The sync-playback amplifiers are supplied by a separate mains unit. Silicon power rectifiers provide the HT and heater voltages for the pre-amplifier stages.

The fuses are located on the top of the supply unit. Each fuse cap contains a neon or filament bulb indicator which lights up whenever a fuse is blown, showing any faulty fuses at a glance.

Caution !

When replacing fuses attention must be paid to the colour marking on the fuse holder and associated cap. Always put them back according to their colour coding as the built-in indicator lamps are designed to work on different voltages.

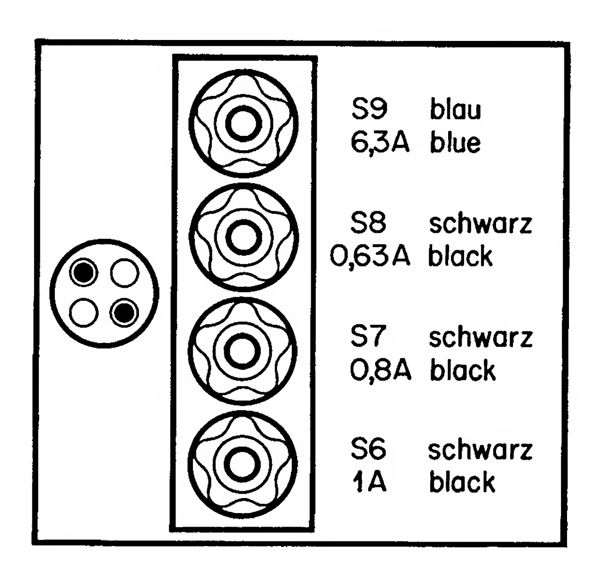


Fig. 13

S 6 = 1.0	Amp, black	Transformer T 863/I (primary side)
S 7 = 0.8	Amp, black	Transformer T 864/I (primary side)
S 8 = 0.63	Amp, black	Rectifier OA 214 (AC side)
S 9 = 6.3	Amp, blue	Stabilized DC-heater voltage (AC side)

The above values apply to the 220 V model only.

For 117 V version:

S 6 = 2.0 Amp black

S 7 = 1.6 Amp black

All fuses are of the "slo-blo" type and have the dimensions 5 x 20 mm.

The 6.3 V heater winding of the transformer T 863/I provides the heater voltage for the two regulating valves E 130 L in the stabilizer circuit, which have a cathode potential of + 250 V with respect to chassis.

D 4b Plug-in Stabilizer

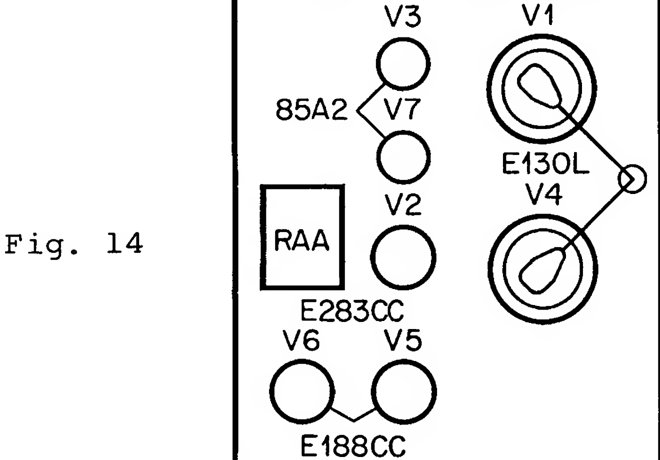
The stabilizer unit contains the stabilizing circuits for the HT-voltage for the oscillator and the amplifiers. This electronic stabilizer provides excellent smoothing, maintains a constant plate voltage and makes it independent from fluctuations and surges in the mains supply. This ensures accurate maintenance of the bias levels. The low source impedance of the HT-supply provides good de-coupling of the amplifier stages.

Pentodes type E 130 L (in triode connection) are used as regulating valves and the control voltage is amplified by the double triode V 2 (E 283 CC) in cascode circuit. The high amplification factor of this valve helps to reduce the hum level to a minimum.

The upper stabilizer in the diagram 7.837.470 with the valves V 1, 2, 3 supplies the playback amplifiers, the lower one with the valves V 4, 5, 6, the record amplifiers and the oscillator.

By means of the contacts of the relay RAA, and a special circuit for the valve V 6, the control

Fig. 14



valve V 5 and the regulating valve V 4, comparatively slow voltage rise in the supply voltage for the oscillator as well as for the valves V 1.1 and V 2.1 of the record amplifier is achieved when the "record" button is operated. This avoids any voltage surge which might cause clicks on "record" and / or magnetise the heads.

When replacing one of the valves V 1 - 5 the corresponding HT-voltage should be tested. The

playback supply voltage can be set by means of RV, the record supply voltage by means of RW; the nominal value is 250 V. P 1 should be set for minimum ripple of the record HT-voltage.

Caution !

The valves of the voltage stabilizer unit must not be removed while the machine is switched on. It is particularly important that the plate caps of the regulating valves V 1 and V 4 (E 130 L) are replaced. It can be seen from the circuit diagram (7.837.470) that otherwise the entire current would flow via the screen grid and the 100 Ω resistor in series with it. This would overload the screen grid and destroy the valve.

D 5 Sync-playback Amplifiers

A three stage voltage amplifier is used for each channel with a frequency selective negative feed-back circuit between the cathodes of the third and the first stages. The time-constants of the circuits are switched to the appropriate values according to the tape speed in use by means of a relay contact.

The output voltages pass through bias traps which are tuned to the bias frequency and are then taken to the mixing circuit which is equipped with buffer stages. The subsequent power amplifier is basicly the same as the output stage of the replay amplifiers. A resistance network in the out-put-circuit permits the use of low impedance headphones for monitoring purposes. The sync-play-back amplifier contains furthermore a monitor amplifier which is also constructed on the same lines as the output stages of the playback channels.

D 6 Power Supply Unit for Sync-playback Amplifiers

The sync-playback amplifiers have their own power supply which is built on a separate plug-in unit.

The unit is placed on the right hand side of the air cleaner. (machine back side)

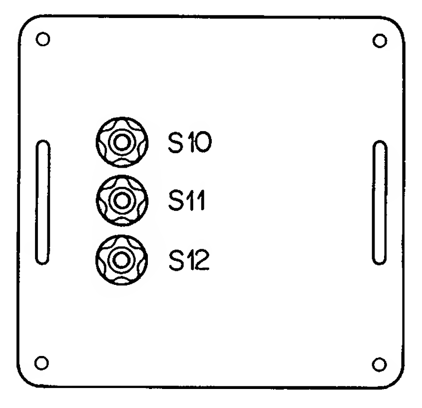


Fig. 15

The following fuse holders with built-in indicator lamps are mounted on its front panel:

S 10 = 0.4 Amp, black	Transformer T 867-I (primary side)
S 11 = 0.2 Amp, black	Rectifier B 390 C 80 (AC side)
S 12 = 1.25 Amp, white	Rectifier B 30 C 1000 (AC side)
	(heater sync-playback amplifier)

All fuses are of the "slo-blo" type and have the dimensions 5 x 20 mm.

When replacing fuses attention must be paid on the fuse holder and associated cap : Indicate colour before removing .

HT-voltage is provided by a stabilizer circuit consisting of rectifier B 390 C 80 and the tubes V 1, V 2 and V 3 (see schematic 7.837.618). Using potentiometer P 1,the HT-voltage may be altered. It has to be calibrated to a value of +250 V.

DC-heating is provided for the tubes V 1 to V 8 (rectifer B 30 C 1000). The heater of the remaining tubes V 9 to V 12 are connected directly to the transformer T 867-I.

Caution !

In recorders with serial nos. 5001 to 5030 the connection (Y) is led to the 240 V tap of the transformer T 870 a (see schematic 7.837.001). This transformer is situated in the power supply unit of the tape transport mechanism. In this recorders the transformer of the sync-playback amplifier is marked T 867 instead of T 867-I.

E Alignment Procedures

The electrical tests and alignments of a tape recorder consist basicly in achieving an overall frequency response within tolerances and the best compromise between the amount of pre-emphasis and effective signal-to-noise ratio. For the best compromise it is necessary to use a pre-emphasis in recording and an equal but opposite de-emphasis in reproduction in order to achieve a flat overall response. It is therefore, in no way sufficient to achieve a flat overall response which could still lead to wide discrepancies in frequency response it - as is very common - the tape is not played back on the machine that it was recorded on.

The frequency response of the playback channel has been specified by international standards. The frequency response of the record channel, however, is not standardised. It should be arranged in such a way as to give a flat overall response with the type of tape in use.

The most usual standards for the frequency response of the playback channel are the CCIR recommendations No. 135 (London 1953) and No. 209 (Warsaw) which have been adopted by many national standard committees. Apart from the CCIR specifications there is the NAB standard which is widely used in the U.S.A. The STUDER J-37 normally uses the CCIR characteristics but it can be supplied with NAB equalisation upon request.

In special cases where the amplitude distribution in the various audio frequency ranges is different from that normally encountered, it might be desirable to employ an equalisation characteristic which differs from the usual standards.

The testing or alignment of the recorder must always begin with the setting up of the playback channel according to the standard in use. Subsequently, the record channel should be adjusted so as to obtain a flat overall response with the particular brand of tape in use.

The playback channel is normally tested and aligned by means of test tapes. In order to make them simple to use,the necessary technical information such as frequency, level etc. is given by recorded announcements. The duration of the various recordings is usually made to correspond to the time normally taken for the various adjustments. To maintain their value as secondary standards these test tapes should be handled and stored with great care. **E**

The most important part of the test or reference tape is the azimuth alignment band. A good high frequency response is only possible when the gaps of the record and replay heads are exactly parallel to each other. But as tapes are more often than not played back on a different machine to the one they were recorded on, it is necessary for purposes of programme interchange, for the gaps of all the heads on all machines to be set at the same angle. The international standard specification is that:

THE GAP SHOULD BE AT RIGHT ANGLES TO THE DIRECTION OF TAPE TRAVEL.

Exept for the instructions for head alignment and the measurements of the mechanical properties under E.3, all the following test and callibration instructions refer to one channel. They should, of course, be repeated for all channels.

It is recommended that the tests and alignments on the STUDER J-37, should be carried out in the following order and using the test instruments and tools mentioned hereafter:

Recommended Test Instruments

The signal generator can be of any make but should have low distortion.
Valve-voltmeters of any make, but preferably for signal to noise measurement the SIEMENS & HALSKE
Rel U 33, or the GENERAL RADIO DISTORTION AND NOISE METER, Type 1932-A.
7 1/2 ips and 15 ips test tapes.
Wow and flutter meter EMT 420 with
high speed pen recorder EMT IIe 1b, or
set of filters EMT 421 or wow and flutter-
meter EMT 414 or 418, both in conjunction
with the high speed pen recorder EMT He 1b.
Distortion meter EMT 126.
De-magnetiser of any make.
Wave analyser or 1000 c.p.s. band pass-
filter of any make

E 1 Alignment of Playback Channel

It is recommended to proceed in the following order:

- switch off recorder and de-magnetise the tape path
- thread test tape and switch to "playback"
- set the output voltage of the playback amplifier to the desired level by means of the pre-set gain control (max. 4.4 V)

The two potentiometers for setting the levels at 7 1/2 ips and 15 ips are electrically independent of one another.

E 1a Setting the Azimuth of the Playback Head for Maximum Output

Play the azimuth section of the test tape and measure the output voltages of channels 1 and 4 at the same time. Adjust the screw C (fig. 6) for maximum output on both channels. If the maximum output of the two channels occurs at different points, an inbetween setting should be chosen which gives an equal relative voltage drop for each channel.

Before the fine adjustment according to E 5a the playback frequency response should be checked.

E 1b Aligning the Frequency Response of the Playback Channels

- the frequency response section of the test tape is used for this alignment. It is recorded at a level of -20 db.
- Check that the frequency response of the output voltage is flat and if necessary correct the high frequency end (10 - 12 kc/s) by means of the trimmer "Entzer-rung" (Equalisation).

There is no inter-action between the trimmers for the two tape speeds.

After this alignment, it is desirable to make a quick check of the noise voltage at the output of the playback amplifier with the machine running but without tape and with the head screen in po-

sition. The tape tension balance must be turned slightly from its rest position in order to switch the capstan motor on. The weighted and unweighted signal-to-noise ratio should be within specification (see "Technical Details")

E 2 Alignment of Record Channel

Once the playback channel has been aligned to within specification, the gain and frequency response of the record chain can be set up. the procedure is as follows:

E 2a Alignment of Record Head Azimuth

- Load the machine with a blank tape. Select the tape speed 15 ips and switch into "record"
- Feed a 10 or 12 kc/s signal from the signal generator to the inputs of channels 1 and 4 at a level of -10 db (measured at the output of the playback amplifier)
- measure the replay voltages of channels 1 and 4 by means of 2 VTVMs.

The azimuth of the record head is adjusted by means of the screw C (fig. 6) for maximum voltage on both channels as described under E 1a for the playback head. It should be remembered that there is a certain delay between the adjustment of the screw C and the re-action on the VTVMs due to the distance between the record ans replay heads. It is therefore advisable to turn the azimuth adjusting screw very slowly.

E 2b Setting the Bias Level

The STUDER J-37 is set at the factory for the correct bias level for the tapes AGFA PER or BASF LGR which are preferred tapes in European recording studios.

It is recommended to repeat the bias adjustment for optimum results with the type of tape that is going to be used.

It is essential that the alignments described above have been completed before setting the bias level.

The bias level affects both the high frequency response and the distortion produced on the tape. The following method of adjustment will give a suitable compromise between these two factors. If special tapes are going to be used such as high output tapes (AGFA PER 555, SCOTCH 122) a different setting up procedure may be used and this will depend on whether a low distortion, or a high modulation level and therefore increased signal-to-noise ratio are primary requirements. As these are very special requirements, the relevant techniques will not be described any further.

The Normal Setting Up Procedure for the Bias Level is as Follows:

- Load blank tape. Select desired tape speed and switch to "record".
- Set the signal generator to 1000 c/s for 15 ips or to 333 c/s for 7 1/2 ips at a level of 10 db below reference level and connect to input.
- Measure the output level of the playback amplifier by means of a VTVM.
- Loosen the lock nuts of the pre-set potentiometers for the bias level which are mounted on the front of the oscillator section (see fig. 11) and turn the potentiometers fully anti-clockwise. Figure 11 shows which potentiometer belongs to which channel at either speed. Their settings do not influence each other.
- At 7 1/2 ips the bias should be increased by turning the potentiometer clockwise

until the output level of the playback amplifier, as measured on the VTVM, has reached a maximum. The potentiometer should be locked in this position by means of the lock-nut.

- At 15 ips the bias is increased by turning the corresponding potentiometer slowly in a clockwise direction and the point where the VTVM across the output reaches a maximum, should be noted. The bias is now further increased until the output level has fallen again by about 1.5 db. The potentiometer should be locked in this position by means of the lock-nut.

E 2c Alignment of the Record Gain Control

It can be seen from the technical details, that the input and output levels of the machine can be varied within a fairly wide range. It is only a question of the gain of the two amplifiers. The tape itself is always magnetically fully modulated in order to achieve a high signal-to-noise ratio. The gain of the playback amplifier is matched to a fully modulated tape, as described under E 1. The setting of the gain of the record amplifiers should therefore be adjusted so as to obtain a fully modulated tape from the available input voltage.

The Procedure For Setting the Gain is as Follows:

- Load blank tape, select desired tape speed and switch to "record".
- Set the signal generator to 1000 c/s and feed the desired input voltage e.g. 1.55 V, to the input terminals.
- Measure the output level of the playback amplifier by means of a VTVM.
- Set the potentiometer "Level" ("Pegel") on the record amplifier (corresponding to the tape speed in use) so that the output level of the playback amplifier as read on the VTVM, is the same as from reference level of the test-tape. The controls on the playback amplifier must of course not be altered in any way.

E 2d Measuring the Overall Frequency Response

- Set the input voltage to the machine from the signal generator so that the VTVM across the output of the playback amplifier reads at least -20 db with the machine switched to "record". (333 c/s for 7 1/2 ips or 1000 c/s for 15 ips.)
- At the same input voltage at both speeds inject 10 kc/s and adjust the trimmers on the record amplifier marked "Equalisation" ("Entzerrung") 7 1/2" and 15" respectively so as to obtain the same output voltage from the playback amplifier as for 333 c/s and 1000 c/s respectively.
- Repeat the measurements over the entire frequency range from 30 c/s to 15 kc/s with a constant input voltage and note the results. If necessary, the two trimmers may be re-adjusted in order to obtain the smoothest possible frequency response within the working tolerances and the specifications.

E 2e Alignment of Frequency Response of the Sync-playback Amplifiers

- The frequency response section of the test tape should be used for this measurement.
- Check the output level for each channel on the monitor output and if necessary ad-

just the high frequency response (10 - 12 kc/s) by means of the trimmer corresponding to the tape speed on the appropriate amplifier.

There is no interaction between the trimmers for the two tape speeds.

For the measurement of weighted and unweighted signal-to-noise ratio, the 1000 c/s "full-mod" section of the test tape is used. The gain control of the sync-playback amplifier under test as

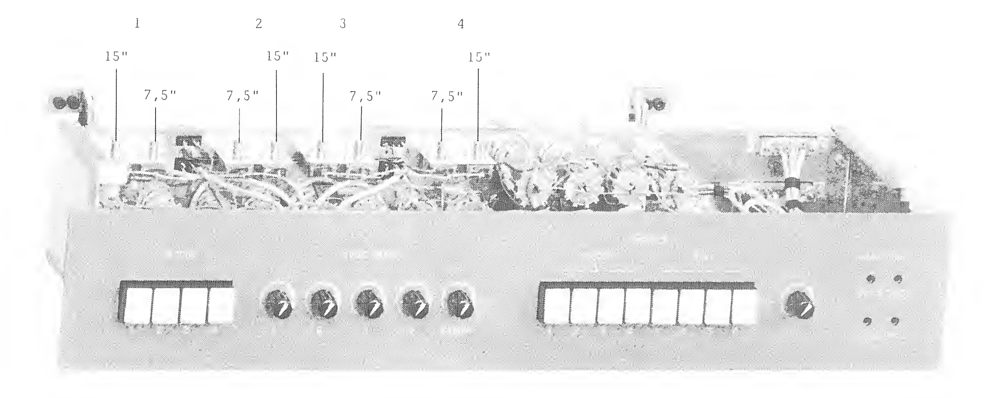


Fig. 16

well as the master fader should be turned to maximum. The resulting voltage on the monitor output should be measured with a VTVM and noted. It serves as reference level for the signal-to-noise measurements. The procedure from then on is similar to the one described under E 2g.

E 2f Distortion Measurements

Once all the above-mentioned alignments have been carried out, the distortion can now be measured. For this purpose it is advisable to use measuring instruments with a high-pass filter to avoid disturbances due to frequency fluctuations which can cause trouble on instruments using bridge-circuits.

Distortion readings, when taken during recording, may also be affected by any bias break-through. It is therefore preferable to rewind the tape and make the distortion measurements during playback. In high quality professional tape recorders the obtainable values with regard to distortion and signal-to-noise ratio are limited by the tape itself and not by the amplifiers.

In order to achieve the best possible signal-to-noise ratio, the recorded level on the tape should be increased until the distortion has reached the maximum permissible level.

At high levels the tape produces mainly third harmonic distortion which is particularly objectionable in speech and music recordings. It is therefore good practice to take the third harmonic component alone as criterion and to adjust for this alone rather than to consider the total harmonic distortion. The distortion meter EMT 126 is a measuring instrument which was specially developed for this purpose and at the same time, it is very easy to handle. A usual value of third harmonic is 1 - 2 % and this is acceptable for most purposes.

Normal tapes will produce this amount of third harmonic at a recorded flux level of app. 200 Millimaxwell. There are tapes which can carry higher levels which may have advantages in this respect, however, they tend to have other disadvantages.

Distortion is usually measured at 1000 c/s at 15 ips as well as 7 1/2 ips so that the third harmonic will be 3 kc/s. At 1000 c/s, the distortion measurement is carried out at full modulation, but if measurements are carried out at higher frequencies the input level should be reduced in accordance with the recording pre-emphasis. This pre-emphasis is not a characteristic of the tape recorder but of the tape and it is absolutely permissible for speech and music recordings as the peak energy distribution is lower in the high frequency region.

In the section E 2b "Bias", it was mentioned that distortion is very much a function of the bias current. The setting-up procedure for the bias current described in that paragraph is the most usual one. To achieve optimum results it may at times be advantageous to alter this level and checking the resulting third harmonic component and signal-to-noise ratios. For this purpose, the third harmonic distortion meter EMT 126 is again very suitable as it is independent of input voltage provided that the input is not less than app. 4 V. Accordingly, it is necessary but only for this particular measurement to increase the gain of the playback amplifier by turning the pre-set potentiometer up.

E 2g Noise Level Measurements

In order to achieve optimum results, the following precautions should be taken:

- De-magnetize the heads as well as any steel parts which come into contact with the tape, in a gradually diminishing AC field. This should be done at regular intervals to maintain minimum noise level in the recorder.
- The bias breakthrough in the playback amplifier should be reduced to a minimum by tuning the bias-trap. The best way to do this is by connecting a sensitive wideband oscilloscope to the output of the playback amplifier.
- A particularly "quiet" valve may be selected for the first stage in the playback amplifier. However, for normal purposes this is not necessary.

The noise measurement should be carried out with a VTVM with a frequency response extending not too far above 15 kc/s.

Noise measurements are first taken with no tape in the recorder both with the machine in "stop" and in "playback". The tape tension balance should be turned out of its "rest" position in order to energise the capstan motor.

After these measurements the tape is threaded, the input of the record amplifier short-circuited during "record" and the measurement is repeated with the machine running in "playback". The noise level will be higher than previously. The difference shows that the tape is the controlling factor for the final noise level and this is a special feature of the STUDER J-37.

The noise measurements may be repeated "weighted" with an equal loudness curve according to the relevant standards.

As regards noise measurement it should be noted that in certain countries noise measurements are taken exclusively with peak reading volt meters and the figures quoted are peak readings. On the other hand, in countries under Anglo-American influence, RMS readings are preferred. The weighted and unweighted signal-to-noise ratios are therefore also given in RMS values. The technical details for the STUDER J-37 therefore quote the readings obtained by both methods.

E 2h Measurement of Erase Efficiency

To measure the erase efficiency a 1000 c/s band-pass filter or a wave-analyser is required. A tone is recorded and afterwards erased by running the tape through the machine in "record" a second time, but with the input short-circuited. Subsequently, the residual voltage can be measured in the "replay" position via the above-mentioned filter. The erase efficiency depends to some extent on the position of the erase head gap relative to the tape.

E 3 Wow and Flutter Measurements and Tape Slippage

Wow and flutter in tape recorders are instantaneous or periodic fluctuations in tape speed which are caused by slight imperfections in the transport mechanism.

The irregularities in the tape transport are mainly due to shafts or idlers which are out of true (eccentric) or to bearing faults (dirt, rust, etc.). Eccentricities give more or less sinusoidal wow components, bearing faults tend to give sharp peaks. It is, therefore, a good practice which is being adopted more and more widely, not only to measure the wow and flutter but to record it on a pen-recorder. By means of a pen-recording, it is possible to tell at every servicing whether a wow-component has increased substantially compared to a previous measurement and whether it has reached objectionable value. Replacing or re-conditioning the faulty part in time, will avoid costly repairs and equipment breakdown. By means of a pen-recording the faulty component can be identified very quickly as the frequency of the disturbance can be calculated from the wave-length of the disturbance and the paper speed. The frequency of the disturbance is equal to the revolutions of the troublesome part and the wave form of the disturbance is an indication of the type of fault.

Instead of taking a pen-recording, the frequency distribution of the wow and flutter may be analysed by means of a wave analyser. However, it is not so easy to arrive at a clear conclusion by this method and therefore the pen-recording is generally preferred.

Values for wow and flutter should always be quoted as weighted readings. On the other hand, pen-recordings should always be made unweighted, because it makes it easier to pick out the component frequencies and consequently to identify the source of any fault. In the past, wow and flutter figures have mostly been quoted as RMS values but it is now becoming more and more usual to use the peak to peak readings instead i.e. to give the highest instantaneous fluctuations of the tape speed referred to its mean value. Due to the very complex nature of the wave form, the ratio between peak and RMS readings is not a constant value. The ratio tends to be about 2.5 to 5. As these discrepancies could lead to a misjudgement of the quality of a particular recorder, it is important always to state clearly which method of measurement has been used. Readings are best taken with the wow and flutter meter EMT 420 which has been designed to meet the latest standard recommendations on wow and flutter measurements. It may be used in conjunction with the pen-recorder HELCOSCRIPTER EMT or the filter unit EMT 421. For practical purposes sufficiently consistant measurements of weighted wow and flutter may be obtained with the older type wow and flutter meter type EMT 414.

Ideally, the wow and flutter of a tape-recorder should be measured with the aid of a test-tape which has a low wow and flutter content compared with that of the machine under test. However, such tapes cannot be produced for a high quality professional recorder as it is technically impossible to make a "master recorder" that has substantially less wow and flutter. It is therefore

necessary to record the test tape on the machine itself and to take the measurements during replay after rewinding the tape. However, no measurements should be taken during the recording as this might lead to highly erroneous readings because if half the capstan's circumference or an even multiple there-of equals the distance between the record and the replay head, the wow would be cancelled and if the distance was an odd multiple, the effective value would be almost doubled.

Therefore, the measured value is the vector sum of the wow and flutter during "record" and the wow and flutter during "playback". The published values for the STUDER J-37 are based on this method of measurement.

Tape slip - the change in absolute tape speed from the beginning to the end of a reel - is measured by recording a test signal throughout a reel of tape or just at each end. Turning the tape head to tail places the section which was recorded at the start of the reel on its end and it is now played backwards.

This reverses the conditions of holdback tension under which the recording was made and the slight difference in recorded wavelength will now be reproduced as a frequency which differs from the one that was recorded. The difference between the two frequencies in the reversed reel condition can be measured on the EMT 420, wow and flutter meter in position "slip". One half of the indicated value is the amount of tape slip.

Note !

The tape slip is very much a function of the type of tape used, in particular its thickness.

E 4 Alignment of Starting and Brake Characteristics

See under C 8 "Relay Box"

E 5 Phase Angle Measurements

In multi-channel recorders the angle of the head gap relative to the direction of tape movement not only affects the high frequency response but also the phase angle between channels. This phase angle depends much more critically on the gap alignment than the output level at high frequencies. The phase angle is determined by means of suitable measurements of output levels.

E 5a Measurement of the Phase Angle Between the Replay Channels

The measurement should be made by means of the output levels on channel 1 and 4 when playing the azimuth section of the test tape.

First check that the output levels of both channels are equal and if necessary make them equal by means of the gain controls on the playback amplifiers (see D 3).

$$P_1 = P_4 \ [db]$$

Next the two outputs should be connected in series in-phase and the resultant sum-level P_s should be measured. Finally the output terminals of one of the two channels should be reversed so as to connect them in series anti-phase in order to measure the difference level P_d

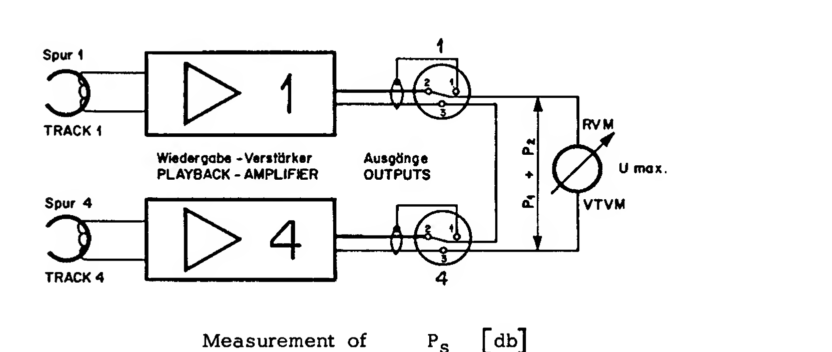


Fig. 17

Measurement of P_s [db]

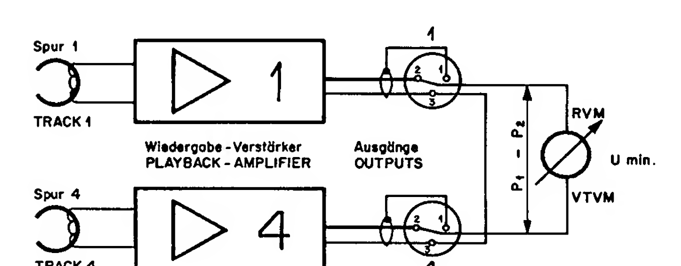


Fig. 18

Measurement of P_d [db]

By subtracting the two measured levels one obtains

$$P_{sd} = P_s - P_d$$

The phase-angle between the two channels can be found from fig. 18 from this value P_{sd}.

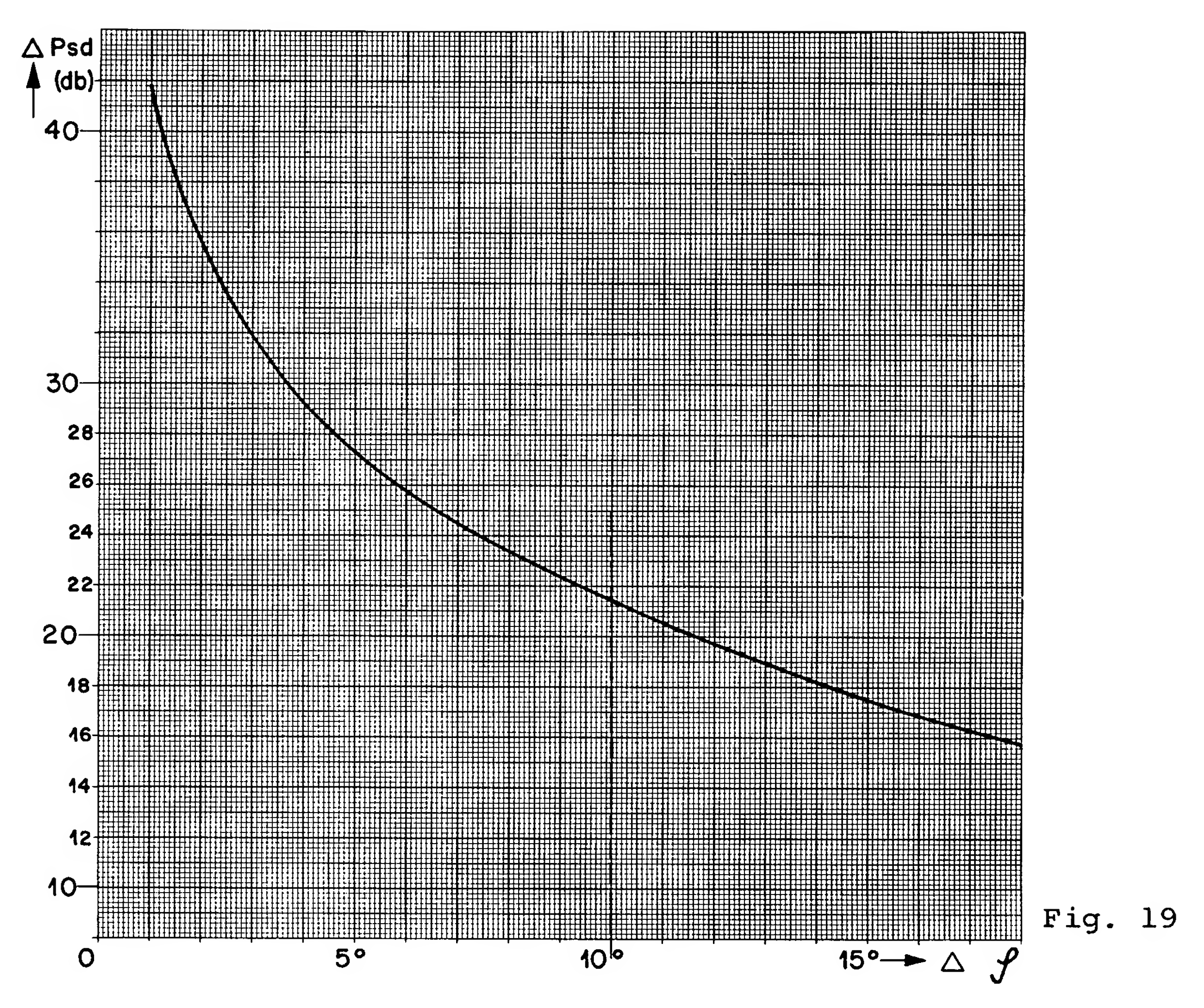


Fig. 19

The screw C (fig. 6) on the replay head should be re-adjusted for a maximum of P_s or a minimum of P_d.

In order to test the geometrical properties of the head, this measurement may be repeated for the other channels.

E 5b Measurement of the Phase-Angles via Tape

The inputs of two channels (preferably channel 1 and 4) should be connected in parallel in-phase and fed from a signal generator. For this test a new tape should be used. A warped tape will give faulty readings. The measurements are now made on the outputs of the playback channels in question, as described under E 5a.

The record head can be re-adjusted for minimum phase angle error by means of the screw C (fig. 6). To get a sharp phase-error minimum the test frequency should be made as high as possible (app. 10 kc/s). There is, however, a danger that the gap of the two channels may be set for adjacent maxima of the magnetised tape. To eliminate this source of error the generator should be swept from 1 - 10 kc/s with the two outputs connected in series in-phase (measurement of P_s) before adjusting the head. If this results in cancellation of the level P_s at any point, the head is misaligned as described above.

F Maintance Schedule

In order to maintain optimum performance and to protect the recorder against damage, the following maintenance schedule should be adhered to rigerously. The servicing intervals quoted in the following are based on the assumption that the recorder will be operated eight to ten hours a day and they should be regarded as maker's recommendations. It may be desirable to alter the service intervals depending on the amount and type of the use the machine has been subjected to.

Every 10 hours of operation

cleaning the heads	Using a soft linen cloth, clean the head faces and remove any hardened deposits with ethylene-trichloride. If very high quality tapes are used this operation may be carried out less frequently.

Every 50 hours of operation

de-magnetize heads and all steel parts in the tape path	De-magnetize the heads and all steel parts in the tape path by means of a suitable de-fluxer.
Clean rubber pinch-roller	If a brown deposit has formed on the pinch-roller, the wheel should be dismantled and cleaned with ethylene-trichloride. Important ! It is essential to remove the pinch-roller for cleaning to avoid damaging the grease under the plastic cap of the capstan or the paint on the recorder.
Cleaning the capstan	During the first weeks of operation grease might ooze from the plastic cap. This should be carefully removed with a soft linen cloth ; hardened deposits should be removed with an India-rubber - never use any hard instruments.

Every 300 hours of operation

check amplifiers and azimuth	See under E "Alignment procedures".

Every 1000 hours of operation

Test the brakes	- as under C 2
Test the pinch-roller	- as under C 6
Oiling the tape lift mechanism	Place a few drops of "Teresso 43" oil on the moving parts.

Every 2000 hours of operation

check heads and headblock.

As the head life time depends considerably on the tape brand it is impossible to predict a certain amount of hours. If a treble loss is deceted - which is not caused by a disaligned azimuth or particels of tape coating on the head surface - presumably the gap is worn and the head has to be replaced. The replacement should be done by well trained technicians only. If these facilities are not existing it is advisable to replace the complete head block. For replacement refer to chapter C 1 E 1a and E 2a.

Every 5000 hours of operation

lubricating the capstan assembly

a. Main bearing

The upper main bearing (7 in fig 8) of the capstan is equipped with a supply of grease to last for its life time. This supply can be seen at the upper end of the bearing, underneath the transparent plastic cap.

b. Lower motor bearing

The units with seriel numbers from 5031 onwards have a special lubricating nipple on the capstan motor for lubricating the ball-trust which should be oiled with Teresso 43 by means of a suitable pressure oiler.

Under no circumstances should any oil other than Teresso 43 be used.

Spooling motors

The spooling motors have no lubricating points and do not generally require any special servicing.

Every 8000 to 10,000 hours of operation

the capstan should be replaced

The capstan should be replaced when the grease in the bearing under the plastic cap has been used up. The grease reservoir under the plastic cap of the bearing is designed to last for the entire life of the capstan.

For dismantling and fitting the capstan see under C 6.

Spooling motors

The ball-bearings of the spooling motors have a life expectation of approximately 10,000 operating hours. After this period of time, the ball-bearings and the appropriate oil retaining felt rings should be replaced.

Other additional oiling is not necessary and should therefore be avoided.

Important !

All other moving parts of the recorder such as the guide rollers are lubricated for life (app. 20,000 hours of operation) and need no special servicing. If any of the bearings become noisy before this length of time, these faulty bearings should be replaced. The order numbers can be found in the spare parts list.

G Parts List

Electrical- and Audio Connectors

Power Cord Plug	54.04.0101
Cannon Cord Plug, pin insert	54.02.0280
Cannon Cord Plug, socket insert	54.02.0281
Remote Control Connector	54.02.0226
Cap for Remote Control Connector	54.02.0234

Tape Transport Mechanism

Turntable, complete		1.837.570
Dustplate		1.337.101-09
Adapter Base		1.337.280-06
Damping Buffer for adapter base		1.337.280-07
Adapter for NAB core 1"		1.013.024
Adapter Insert NAB 1"		1.013.026
Adapter for DIN core 1"		1.013.020
Adapter Insert DIN 1"		1.013.022
Height Adjustment Bushing for headblock		1.337.101-56
Height Adjustment Spacer for headblock		1.337.101-57/58
Set of spacer rings: D1/D2 =	11 / 6,2 x 0,1 mm	1.337.101-05
	11 / 6,2 x 0,5 mm	1.337.101-37
	14 / 9,5 x 0,1 mm	1.337.101-52
	14 / 9,5 x 0,5 mm	1.337.101-53
	16 / 6,2 x 0,1 mm	1.337.101-43
	16 / 6,2 x 0,5 mm	1.337.101-42
	52 / 31 x 0,1 mm	1.337.101-38
	52 / 31 x 0,5 mm	1.337.101-37

Brace	1.337.524
Spring Housing with guidebar	1.337.508
Disk Spring for spring housing	37.01.0136
Head Mount, four track 1", complete (1.837.284)	1.020.050
Erase Head, four track 1"	1.016.320
Record Head, four track 1"	1.016.325
Playback Head, four track 1"	1.016.330
Tape Guide Pin 1" left	1.020.182
Tape Guide Pin, 1", right	1.020.184
Lid for head mount, complete	1.020.117
Name Plate for head mount	1.020.117-02
Fixing Bolt for lid	1.020.117-03
"Push-on-Fix"	22.16.5001
Amphenol Connector, 24 contacts	54.02.0132
Spring Ring	1.337.192-05

Head Shield Mechanism	1.837.272
Fluted Bakelite Disk for head shield mechanism	1.337.418
Recording Cable, complete	1.837.540
Harting Connector, 26 contacts	54.02.0118
Cap for Harting Connector	54.02.0126
Amphenol Connector, 24 contacts	54.02.0113
Playback Cable, complete	1.837.550
Amphenol Connector, 24 contacts	54.02.0113
Tuchel Connector T 3261	54.02.0247
Tape Tension Control Assembly, complete	1.837.048
Idler Plate complete with idlers	1.837.060
Center Disk	1.337.101-15
Shaft	1.337.192-03
Tape Tension Potentiometer, printed circuit board, wired	1.837.050
Wiper Arm, complete	1.837.052
Dash-Pot, tension control	1.337.394
Shaft for Dash-Pot bearing	1.337.101-33
Solenoid, complete	1.337.208
Cord, complete	1.337.212
Tension Spring, small	1.337.192-10
Tension Spring, big	1.837.048-01
Plexi-Glass Disk	1.337.192-04
Spring Ring	1.337.192-05
Ball Bearing d=7, D=19, h=6 (EL 7 ZZ)	41.02.0105
Ball Bearing d=6, D=19, h=6 (EL 6 ZZ)	41.02.0104
Ball Bearing d=2, D=6, h=2,3	41.02.0101
Amphenol Connector, 8 contacts	54.02.0224
Cap for Amphenol connector	54.02.0234
Cord Grip	54.02.0236
Flywheel Idler Assembly, complete	1.837.080
Flywheel Idler	1.837.001-51
Flywheel Shaft	1.837.080-01
Center Disk	1.337.101-14
Flywheel, complete	1.337.225
Cone	1.337.224-06
Ball Bearing (low noise type) d=8, D=22, h=7, (EL8 Z)	41.02.1106
Flywheel Magnet	1.337.226
Cord Plug, 3 contacts	54.02.0201

Tape Lift Mechanism, complete	1.837.250
Tape Lift Pin	1.837.250-01
Spring, tape lift	1.337.380-15
Dash-Pot, tape lift	1.337.390
Solenoid, tape lift	1.014.400
Cord Plug, 4 contacts	54.02.0202
Fluted Bakelite Disk, tape lift	1.337.424
Switch assembly	1.337.420
Micro Switch 1 A/250 V	55.01.0121
Cord Plug, 3 contacts	54.02.0201
Capstan Assembly, complete	1.837.020
Capstan Motor, incl. cable	1.337.180
Capstan Bearing, complete (50 cps)	1.837.030
Protection Cap PVC	1.337.162-01
Rubber Idler	1.837.001-53/54
Cover Nut	1.337.101-10
Rubber Idler Bearing	1.837.042
Ball Bearing d=10, D=19, h=4,5	41.02.4102
Ball Bearing d=7, D=19, h=6 (EL 7 Z)	41.02.1105
Retain spring	1.736.502-09
Tension spring	1.337.158-11
Solenoid	1.337.174
Tag Board	1.337.174-01
Lug	29.26.2001
Flexible Coupling for Flywheel	1.337.184
Lock Washer for Flywheel	1.337.152-02
Amphenol Connector for Motor Cable, 11 contacts	54.02.0225
Cap for Amphenol connector	54.02.0234
Cord Grip	54.02.0236
Tape Timer, complete	1.837.085
Idler, tape timer	1.837.001-52
Cover Disk for Idler	1.337.101-14
Botton Disk	1.337.101-47
Plexi-Glass Dial	1.837.001-20
Spacer	1.337.101-08
Shaft	1.837.085-01
Timing Belt, US Power Grip	36.01.0101
Ball Bearing, (low noise type) d=4, D=13, h=5 (EL4 ZZ)	41.02.0102
Ball Bearing, (low noise type) d=5, O=16, h=5 (EL5 ZZ)	41.02.0103
Ball Bearing, (low noise type) d=7, D=19, h=6 (EL 7 Z)	41.02.1105

Timer Scale Cover (Plexi-Glass)	1.337.101-04
Worm Pinion	1.337.248-16
Worm Pinion Shaft	1.337.248-14
Worm Wheel	1.337.248-13
Spur Gear	1.337.248-12
Gear Shaft	1.337.248-11

Guide Roller, small, complete	1.837.255
Ball Bearing (low noise type) d=8, D=22, h=7 (EL 8 Z)	41.02.1106
Cover Disk	1.837.255-04

Guide Roller, left	1.837.001-50
Cover Disk	1.337.101-14
Botton Disk	1.337.101-46
Shaft	1.837.046-01
Guide Roller Bearing	1.837.046
Ball Bearing d=7, D=19, h=6 (EL 7 Z)	41.02.1105

Further parts for tape transport

Torque Motor, complete	1.837.110
Brake drum, complete	1.837.105-03
Brake Band, special	1.837.107
Servocord, complete with spring	1.837.103
Spiralspring for Servocord	1.837.103-02
Brake, tension spring	1.736.502-10
Knurled Screw	1.337.280-04
Knurled Nut	1.337.280-03
Solenoid	1.014.200
MP Capacitor 8 mfd-G 630/1 (Bosch)	59.99.0901
Cord Plug, 3 contacts	54.02.0201

Push Buttons

Push Button Assembly left, complete	1.337.252
Push Button Assembly right, complete	1.837.090
Push Button "fast forward"	1.337.254
Push Button "fast rewind"	1.337.256
Push Button "play"	1.337.258
Push Button "stop"	1.337.260
Push Button "record"	1.337.262
Push Button (no symbol)	1.837.092
Push Button "7,5"	1.337.270
Push Button "15"	1.337.272
Push Button "off"	1.337.274

Torsion Bar	1.337.252-02
Spring Blade	1.337.252-10
Spring Blade	1.337.252-11
Micro-Switch IA/250V	55.01.0102
Amphenol Connector, 11 contacts	54.02.0226
Cap for Amphenol Connector	54.02.0234
Cord Grip	54.02.0236
Pilot Lamp 24 V / 0,08 Amp "Rafi"	51.02.0122
Lamp Holder, spec.	53.04.0101
Power Supply, tape transport, 50 cps	1.837.150
Power Transformer T 870a	1.837.185
Magnetic Amplifier, complete	1.837.168
Transformer T 859	1.837.174
Indication Plate : Mains 220 V	1.337.342-04
Indication Plate: Power supply, tape transport	1.337.342-05
Relais Box, complete	1.837.115
Relais "Schrack" (SBrv, SB, SStv, SK, SV)	56.02.0101
Relais "Schrack" (SBz, SR, SSM, SL_1, SL_2, SS_1, SS_2)	56.02.0102
Relais Siemens (RBrv, RB, RV, RR, RBh, RVh, RRh, RF, RAM)	56.01.0102
Relais Clamp	56.01.0124
Remote Control Dummy Plug	1.337.842
Elapsed Time Indicator	73.01.0101
Resistor spec. (270 Ω, 170 W)	1.837.130-04
Capacitor spec. (3 mfd - 6500/1)	1.837.316-06
Capacitor spec. (6 mfd - G 500)	1.837.316-05
Indication Plate: Relais Box	1.837.115-01
Indication Plate: Remote Control	1.837.314-02
Record Amplifier, complete, J-37	1.337.532-J-37
Relais, Siemens RLA	56.01.0102
Input Transformer (TR 145/BV 35590)	62.99.0102
Choke	1.337.568
RF Trap	1.337.582
Potentiometer 100 KΩ log	58.10.2104
Variable Capacitor 20 - 250 pf	1.337.532-06
Cannon Chassis Receptacle XLR - 3 - 31	54.02.0282
Amphenol Connector, 14 contacts	54.02.0131
Indication Plate: Record Amplifier	1.337.532-07

Oscillator, bias and erase, complete	1.837.500
Relais, Siemens (RA_1 - RA_4, RM_1, RM_2)	56.01.0104
Erase Head Dummy Load (D 1 .... D 4)	1.337.966
Oscillator Coil, complete	1.337.764
Symmetry Transformer	1.337.804
Choke, complete	1.337.822
Potentiometer 5 KΩ lin.	58.10.7502
Harting-Connector, male Min 26	54.02.0118
Harting-Connector, female, Min 26	54.02.0119
Amphenol-Connector, male, 14 contacts	54.02.0130
Amphenol-Connector, female, 24 contacts	54.02.0133
Indication Plate: Oscillator	1.837.500-01
Playback Amplifier, complete J-37	1.337.620-J-37
Relais Siemens RLW	56.01.0102
Output Transformer	1.337.688
RF Trap	1.337.582
Potentiometer 100 KΩ log.	58.10.2104
Metal Film Resistor (R 3) 330 KΩ / 1 W	57.34.3334
Variable Capacitor 20 .... 250 pf	1.337.532-06
Tuchel Connector T 3282	54.02.0253
Cannon Chassis Receptacle XLR - 3 - 32	54.02.0283
Amphenol Connector, 14 contacts	54.02.0131
Indication Plate: Playback Amplifier	1.337.620-02
Power Supply, Amplifier, complete	1.837.410
Transformer T 863 / I	1.837.427
Transformer T 864 / I	1.837.442
Amphenol Connector, 4 contacts	54.02.0221
Amphenol Connector, male, 14 contacts	54.02.0130
Amphenol Connector, female, 24 contacts	54.02.0133
Indication Plate: Power Supply Amplifier	1.837.410-02
Regulating Unit, complete	1.837.470
Siemens Relais RAA	56.01.0102
Capacitor 3 x 50 μF / 350 V	59.12.0103
Potentiometer 50 KΩ	1.837.470-04
Resistor (R 16) 330 KΩ / 1 W	54.34.3334
Amphenol Connector, male, 14 contacts	54.02.0130
Amphenol Connector, female, 24 contacts	54.02.0133
Indication Plate: Regulating Unit	1.837.470-03

Sync-Playback-Amplifier, complete	1.837.700
Relais Siemens Rl 1, RL 2	56.01.0104
Input Transformer (Tr 145 / Bv 35590)	62.99.0102
Output Transformer	1.337.688
RF Trap	1.337.582
Push Button Assembly (4 buttons) complete	55.99.0109
Push Button Assembly (8 buttons) complete	55.99.0110
Pilot Lamp 24 V / 0,05 A	51.99.0901
Button Cap (white)	55.99.0901
Jack Assembly (headphones)	1.837.722
Potentiometer 50 KΩ log.	58.10.2503
Potentiometer 100 KΩ log.	58.10.2104
Knob	42.01.2014
Variable Capacitor 20 ... 250 pf	1.837.730-10
Capacitor 3 x 600 mfd / 35 V	59.12.0106
Harting Connector, female Min 26	54.02.0119
Cap for Harting Connector	54.02.0126
Harting Connector, male, Min 20	54.02.0116
Harting Connector, male, Min 26	54.02.0118
Amphenol Connector, 11 contacts	54.02.0226
Brace	1.837.401
Camloc Bushing	33.02.0280
Camloc Push Button	33.02.0205
Camloc Fastening Disk	33.02.0270
Power Supply, Sync-Playback Amplifier complete	1.837.618
Transformer T 867	1.837.632
Potentiometer 100 KΩ lin	58.20.1104
Capacitor 3 x 600 mfd / 35 V	59.12.0106
Printed circuit, complete	1.837.620
Amphenol Connector, male, 8 contacts	54.02.0224
Cap for Amphenol Connector 8	54.02.0233
Amphenol Connector, female, 11 contacts	54.02.0234
Amphenol Connector, female, 11 contacts	54.02.0232
Cap for Amphenol Connector 11	54.02.0234
Cord Grip	54.02.0236
Fan, complete QLD 6/1800-302 ITT Standart	state machine no.
Air-Cleaner	1.837.590-04

Fuse Holder

Fuses

S 1, S 5, S 12	1,25 A	51.01.0118
S 2, S 10	0,4 A	51.01.0113
S 3	4,0 A	51.01.0123
S 4	3,15 A	51.01.0122
S 6	1,0 A	51.01.0117
S 7	0,8 A	51.01.0116
S 8	0,63 A	51.01.0115
S 9	6,3 A	51.01.0125
S 11	0,2 A	51.01.0110

Fuse pilot lamp for :

S 3, S 12	(12 - 24 V)	53.03.0101
S 4	(24 - 48 V)	53.03.0102
S 1, S 2, S 5, S 6, S 7, S 9, S 10	(100 - 250 V)	53.03.0103
S 8, S 11	(200 - 500 V)	53.03.0104

Tubes and semiconductors

Tubes

ECC 81	50.01.9118
ECC 83	50.01.9120
EL 86	50.01.9132
E 130 L	50.01.8102
E 188 CC	50.01.9107
E 283 CC	50.01.9108
85 A 2	50.01.7107

Transistors

ASZ 18	Power Supply, Amplifier LT Regulation	50.03.0201

Diodes

OA 214	Power Supply, Amplifier HT - Rectifier	50.04.0503
OY 5061	Power Supply, Amplifier and Tape Transport Relais and Heater voltage	50.04.0504
OY 5063	Power Supply, Tape Transport Brake voltage rectifier	50.04.0505
1 S 132	Spark quenching diode in : Relais Box Record Amplifier Playback Amplifier Regulating Unit Oscillator Unit Sync-Playback Amplifier	50.04.0111

Zener - Diodes

ZL 7	Power Supply, Amplifier LT Regulation	50.04.1501

Rectifier

B 30 C 1000	Power Supply, Sync Playback Amplifier Heater	70.01.0104
B 250 C 75	Power Supply, Amplifier Aux. Voltage	70.01.0101
B 390 C 90	Power Supply, Sync Playback Amplifier HT	70.01.0105

Interconnection Cable

Interconnection Cable 4 pol.	1.337.844
Interconnection Cable 8 pol.	1.337.846
Interconnection Cable 11 pol.	1.337.848

Cable Tunnel, complete — 1.837.380

Amphenol Connector, 6 contacts	54.02.0223
Cap for Amphenol connector	54.02.0234
Cord Grip	54.02.0236
Amphenol Connector, 24 contacts	54.02.0132
Compression Spring	1.337.514-06
Pin	1.337.514-07

Outlet Board

Chassis Receptacle, pin insert	54.02.0282
Chassis Receptacle, socket insert	54.02.0283
Front Panel (german)	3.837.595-01
Front Panel (english)	3.837.597-01
Front Panel (USA)	3.837.600-01

Extra Accessories

Extension Piece, timer reset lever		1.337.100-03
Allen Screwdriver	2 mm	26.06.1020
	2,5	26.06.1025
	3	26.06.1030
	4	26.06.1040
	5	26.06.1050
	6	26.06.1060
Head Alignment Screwdriver, spec.		1.337.944
Adapter Cable for testing amplifiers 14-pol.		1.337.960
Adapter Cable for testing amplifiers 24-pol.		1.337.964
Spec. Lubricating Oil Teresso 43		99.01.0121
Grease Gun for Capstan Motor		99.01.0202

H Schematic Diagrams

STUDER J 37

Tabelle der Relais- und Magnetfunktionen

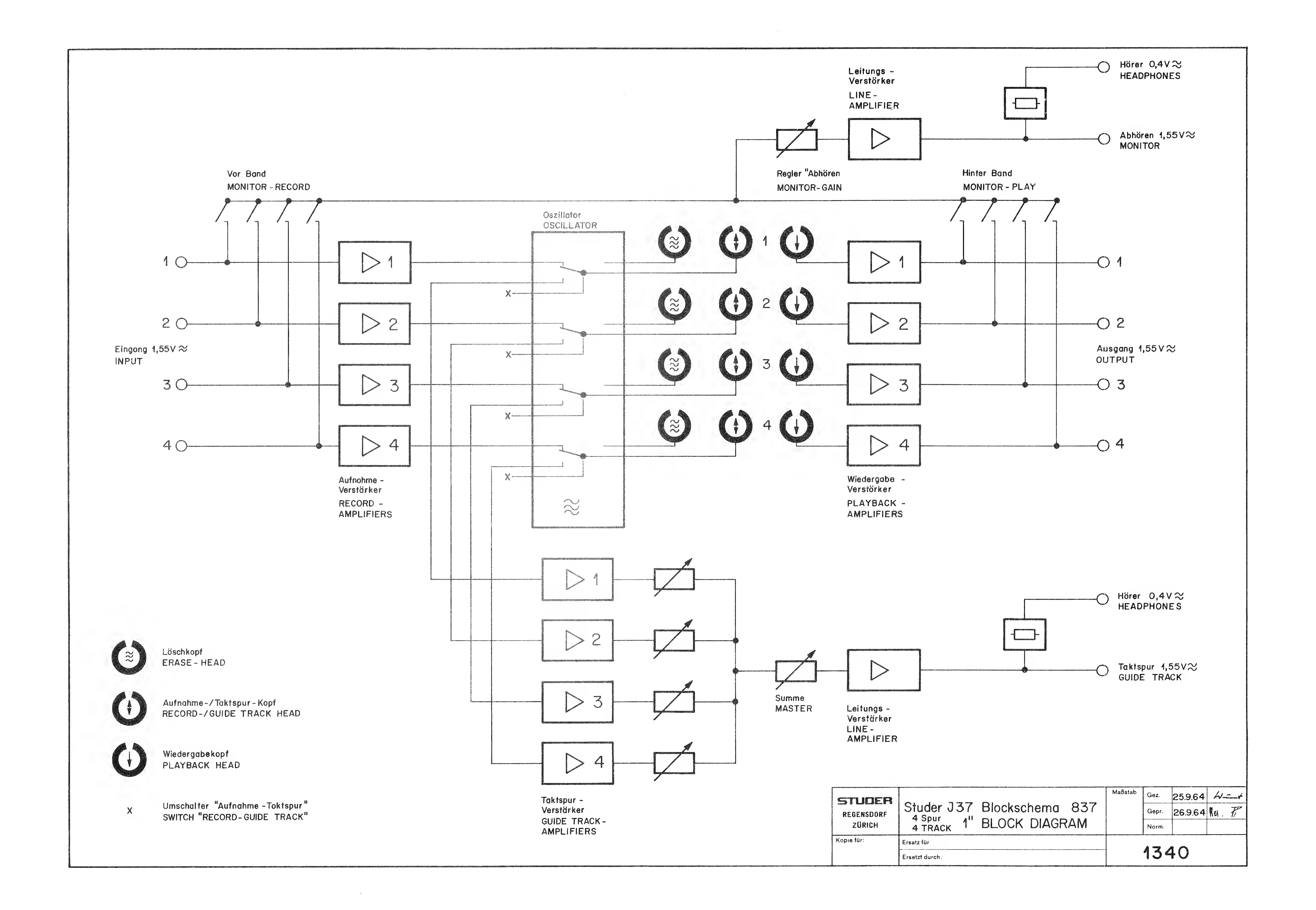
TABLE OF RELAIS AND MAGNET FUNCTIONS

Bandwaage in Arbeitsstellung.

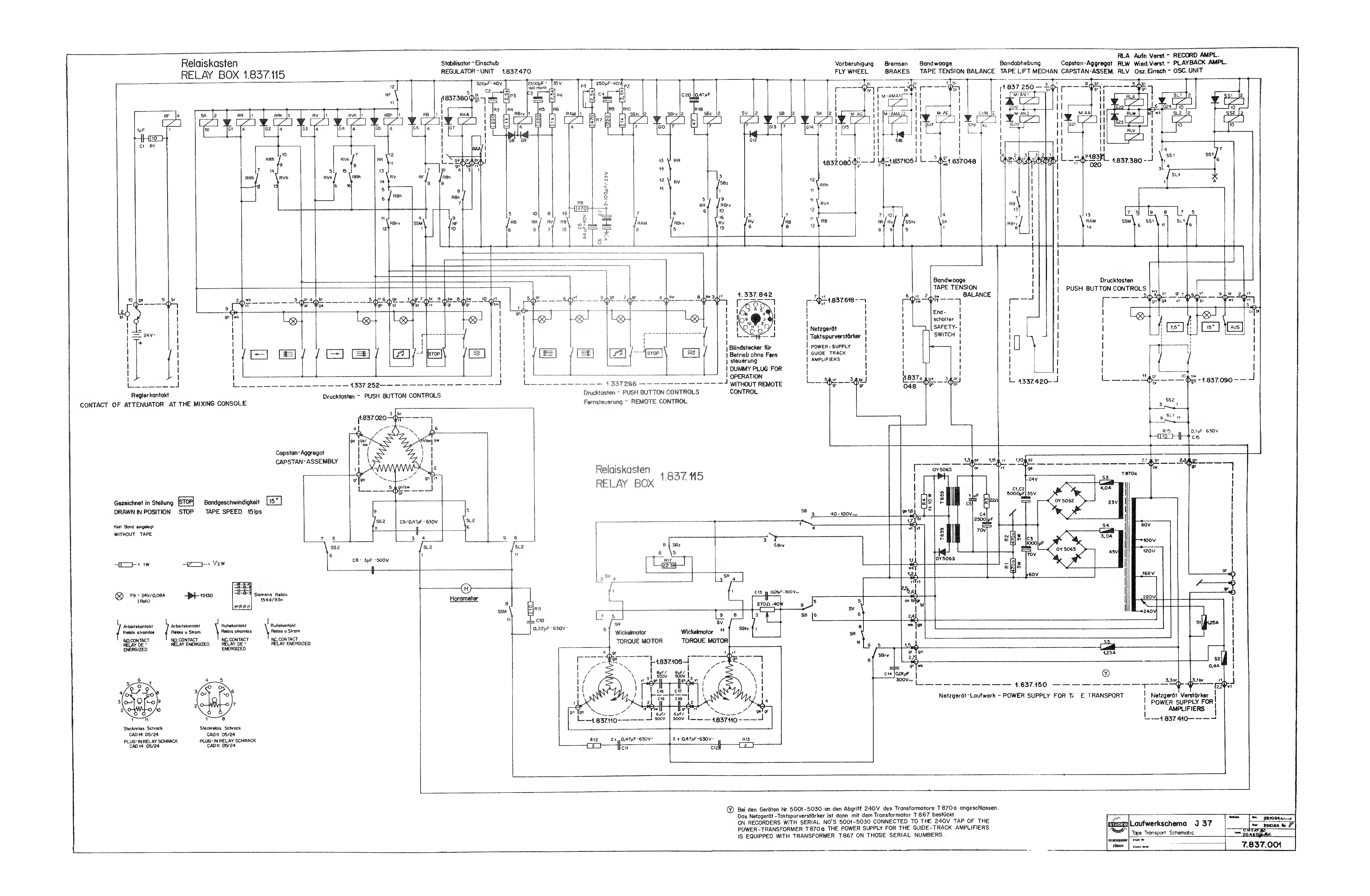
TAPE TENSION BALANCE IN MIDPOSITION

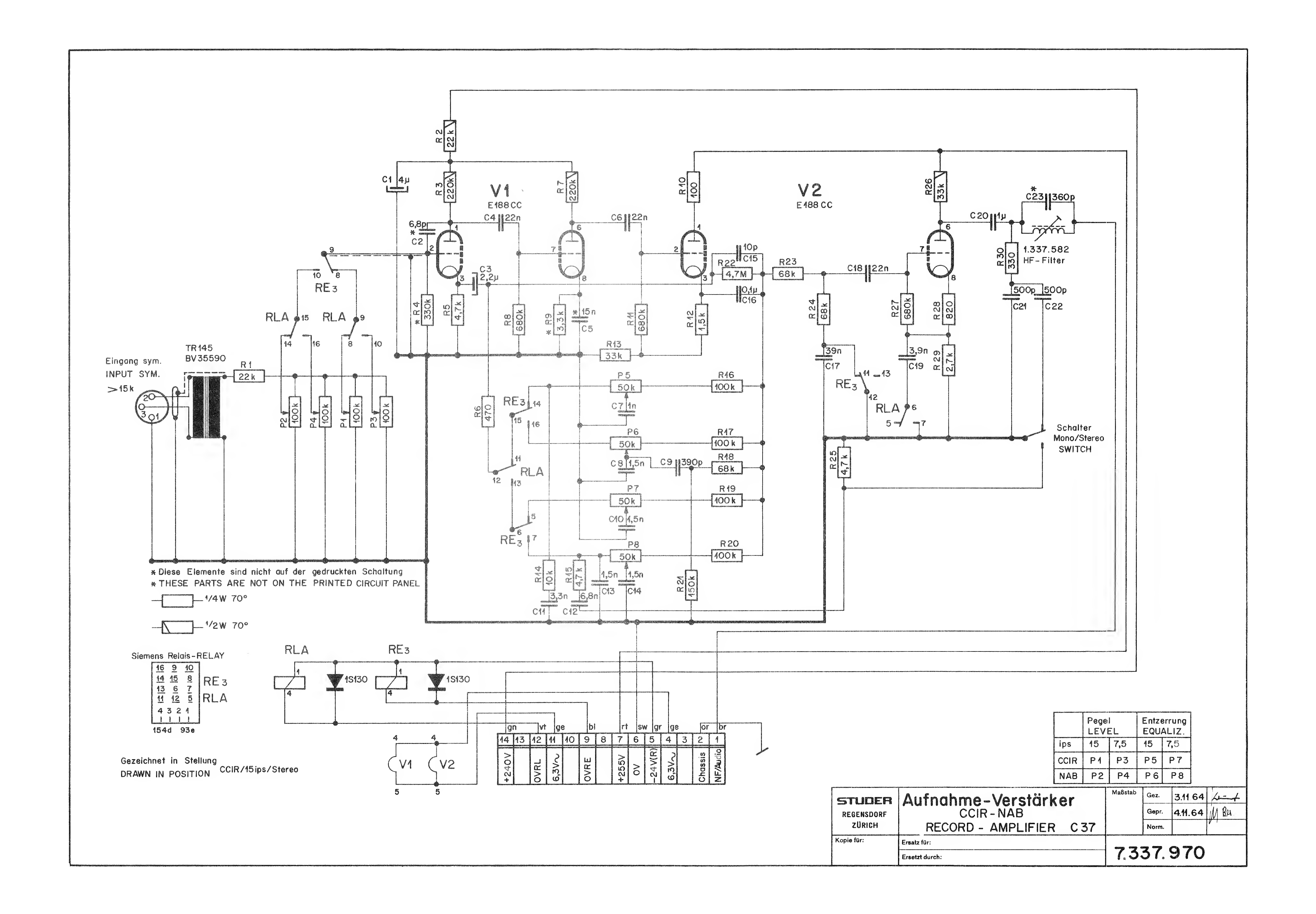
ENTZ. EQUAL. CCIR	NAB	RELAIS	RELAIS	← ← ←		→ → →		♫	STOP	Aufnahme RECORD	Spur TRACK 1	2	3	4	Endschalter SAFETY-SWITCH	Regler FADER	[tape lift symbol]	7,5"	15"	eingebaut in LOCATED IN	Schema Nr. SCHEMATIC NO
			RAA							x										Stabilisator-Einschub 1.837.462 REGULATOR-UNIT	7.837.470
	x	RE_3	RLA (1)															x		Aufnahme-Verstärker 1 - 4 RECORD AMPLIFIERS 1.337.970	7.337.970
			RLA (2)															x			
			RLA (3)															x			
			RLA (4)															x			
	x	RE_1	RLW (1)															x		Wiedergabe-Verstärker 1 - 4 PLAYBACK AMPLIFIERS 1.337.990	7.337.990
			RLW (2)															x			
	x	RE_2	RLW (3)															x			
			RLW (4)															x			
			RM 1															x		Oszillator-Einschub 1.837.480 OSCILLATOR-UNIT	7.837.500
			RM 2															x			
			RA 1								x										
			RA 2									x									
			RA 3										x								
			RA 4											x							
			RL 1															x		Taktspurverstärker 1.837.550 GUIDE TRACK AMPLIFIER	7.837.700
			RL 2															x			
			RF													x				Relaiskasten 1.837.172 RELAY BOX	7.837.001
			RR	x	x																
			RRh		x																
			RV			x	x														
			RVh			x															
			RB					x		x						x					
			RBh					x		x											
			RBrv	x	x	x	x	x		x						x					
			RAM	x	x	x	x		x						x						
			SR	x	x																
			SStv	x	x	x	x		x						x						
			SBrv	x	x	x	x	x		x						x					
			SBz	x	x																
			SV			x	x	x		x						x					
			SB					x		x						x					
			SK	x			x		x						x						
			SSM												x						
			SL 1															x			
			SL 2															x			
			SS 1																x		
			SS 2																x		
			Magnete MAGNETS																		
			M-AA					x		x						x				Capstan-Aggregat 1.837.110 CAPSTAN-ASSEMBLY	7.837.001
			M-AE		x	x		x		x						x				Bandwaage 1.837.130 TAPE TENSION BALANCE	
			M-AG	x	x	x	x		x						x					Vorberuhigung 1.837.144 FLY-WHEEL	
			M-AMA 1	x	x	x	x	x		x						x				Bremsen 1.837.170 BRAKES	
			M-AMA 2	x	x	x	x	x		x						x					
			M-AN 1														x			Bandabhebung 1.837.152 TAPE LIFT MECHAN.	
			M-AN 2	x	x	x	x														

x Relais oder Magnet unter Strom
RELAY OR MAGNET ENERGIZED

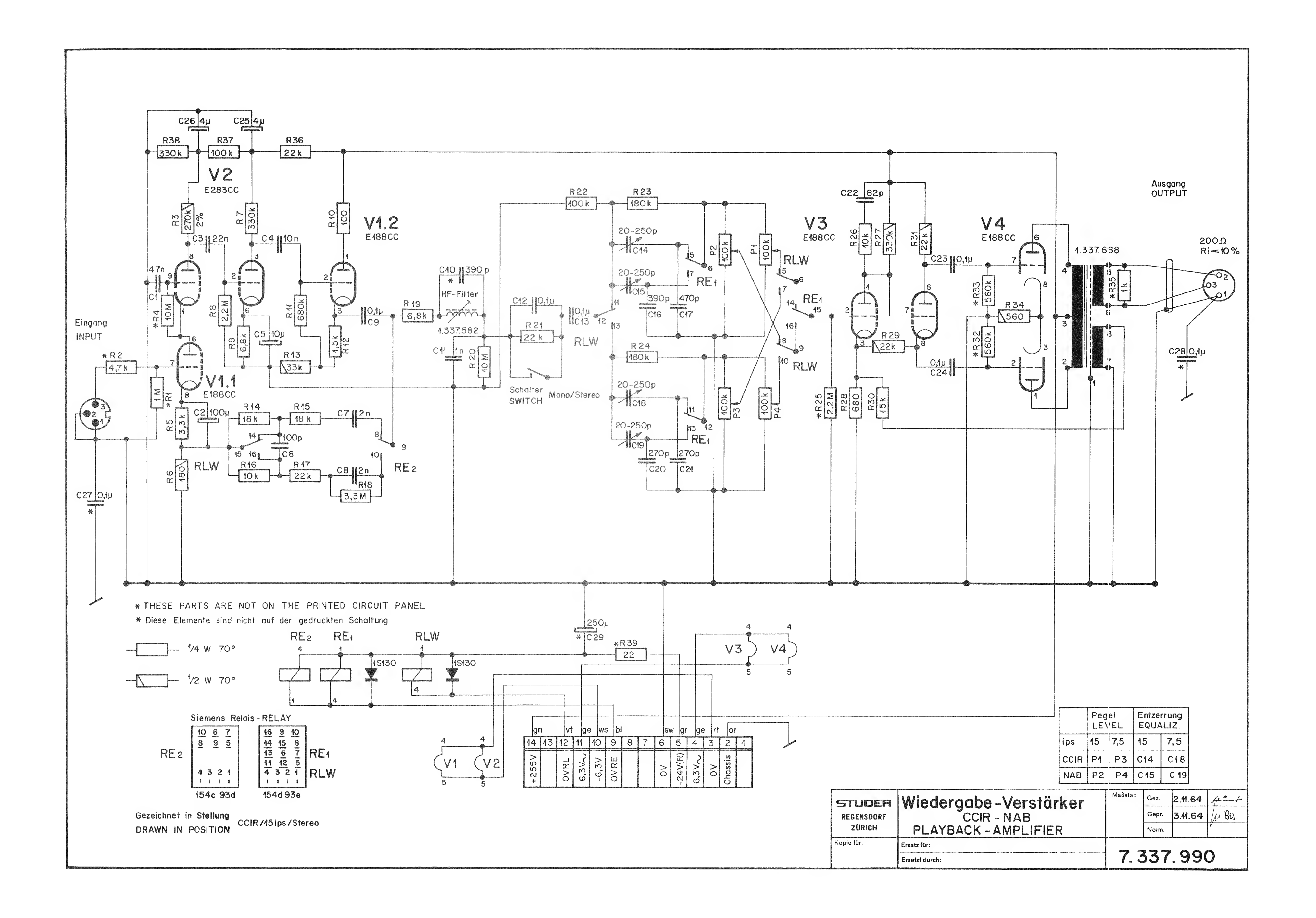


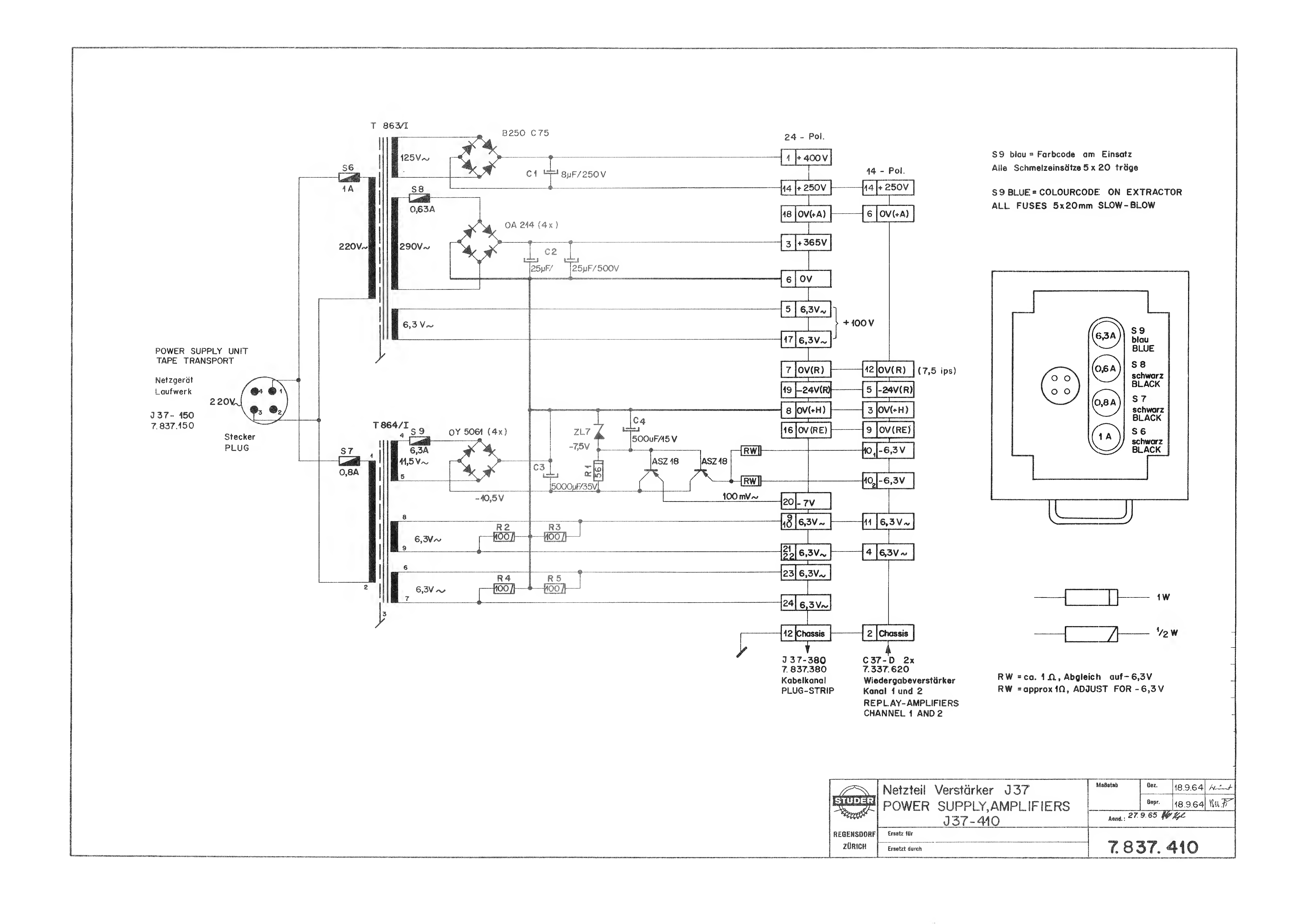
Leitungs - Verstörker
LINE - AMPLIFIER
Hörer 0,4V≈
HEADPHONES
Abhören 1,55V≈
MONITOR
Regler "Abhören
MONITOR-GAIN
Vor Band
MONITOR - RECORD
Hinter Band
MONITOR - PLAY
Oszillator
OSCILLATOR
Eingong 1,55V≈
INPUT
Ausgang 1,55V≈
OUTPUT
Aufnahme - Verstärker
RECORD - AMPLIFIERS
Wiedergabe - Verstärker
PLAYBACK - AMPLIFIERS
Hörer 0,4V≈
HEADPHONES
Taktspur 1,55V≈
GUIDE TRACK
Summe
MASTER
Leitungs - Verstärker
LINE - AMPLIFIER
Löschkopf
ERASE - HEAD
Aufnahme-/Taktspur-Kopf
RECORD-/GUIDE TRACK HEAD
Wiedergabekopf
PLAYBACK HEAD
Umschalter "Aufnahme -Toktspur"
SWITCH "RECORD- GUIDE TRACK"
Taktspur - Verstärker
GUIDE TRACK - AMPLIFIERS
STUDER
REGENSDORF
ZÜRICH
Studer J37 Blockschema 837
4 Spur
4 TRACK
1" BLOCK DIAGRAM
Maßstab
Gez. 25.9.64
Gepr. 26.9.64
Norm.
Kopie für:
Ersatz für
Ersetzt durch:
1340


Relaiskasten
RELAY BOX 1.837.115
Stabilisator-Einschub
REGULATOR-UNIT 1.837.470
Vorberuhigung FLY WHEEL
Bremsen BRAKES
Bandwaage TAPE TENSION BALANCE
Bandabhebung TAPE LIFT MECHAN.
Capstan-Aggregat CAPSTAN-ASSEM.
RLA Aufn.Verst. - RECORD AMPL.
RLW Wied.Verst. - PLAYBACK AMPL.
RLV Osz.Einsch - OSC. UNIT
Reglerkontakt
CONTACT OF ATTENUATOR AT THE MIXING CONSOLE
Drucktasten - PUSH BUTTON CONTROLS
1.337.252
1.337.266
Drucktasten - PUSH BUTTON CONTROLS
Fernsteuerung - REMOTE CONTROL
1.337.842
Blindstecker für Betrieb ohne Fernsteuerung
DUMMY PLUG FOR OPERATION WITHOUT REMOTE CONTROL
Netzgerät Taktspurverstärker
POWER-SUPPLY GUIDE TRACK AMPLIFIERS
1.837.618
Bandwaage TAPE TENSION BALANCE
End-schalter SAFETY-SWITCH
1.337.420
Drucktasten PUSH BUTTON CONTROLS
1.837.090
Capstan-Aggregat CAPSTAN-ASSEMBLY
1.837.020
Relaiskasten RELAY BOX 1.837.115
Gezeichnet in Stellung STOP DRAWN IN POSITION STOP
Bandgeschwindigkeit 15" TAPE SPEED 15ips
Kein Band eingelegt WITHOUT TAPE
F9 - 24V/0,08A (Rafi)
Siemens Relais 154d/93n
Arbeitskontakt Relais stromlos N.O.CONTACT RELAY DE-ENERGIZED
Arbeitskontakt Relais u.Strom N.O.CONTACT RELAY ENERGIZED
Ruhekontakt Relais stromlos N.C.CONTACT RELAY DE-ENERGIZED
Ruhekontakt Relais u.Strom N.C.CONTACT RELAY ENERGIZED
Steckrelais Schrack CAD14 05/24 PLUG-IN RELAY SCHRACK CAD14 05/24
Steckrelais Schrack CAD11 05/24 PLUG-IN RELAY SCHRACK CAD11 05/24
Horameter
Wickelmotor TORQUE MOTOR
Wickelmotor TORQUE MOTOR
1.837.105
1.837.110
1.837.110
T870a
1.837.150
Netzgerät-Laufwerk - POWER SUPPLY FOR THE TRANSPORT
Netzgerät Verstärker POWER SUPPLY FOR AMPLIFIERS
1.837.410
Ⓨ Bei den Geräten Nr 5001-5030 an den Abgriff 240V des Transformators T870a angeschlossen. Das Netzgerät-Taktspurverstärker ist dann mit dem Transformator T867 bestückt.
ON RECORDERS WITH SERIAL NO'S 5001-5030 CONNECTED TO THE 240V TAP OF THE POWER-TRANSFORMER T870a THE POWER SUPPLY FOR THE GUIDE-TRACK AMPLIFIERS IS EQUIPPED WITH TRANSFORMER T867 ON THOSE SERIAL NUMBERS
STUDER
Laufwerkschema J 37
Tape Transport Schematic
REGENSDORF ZÜRICH
7.837.001

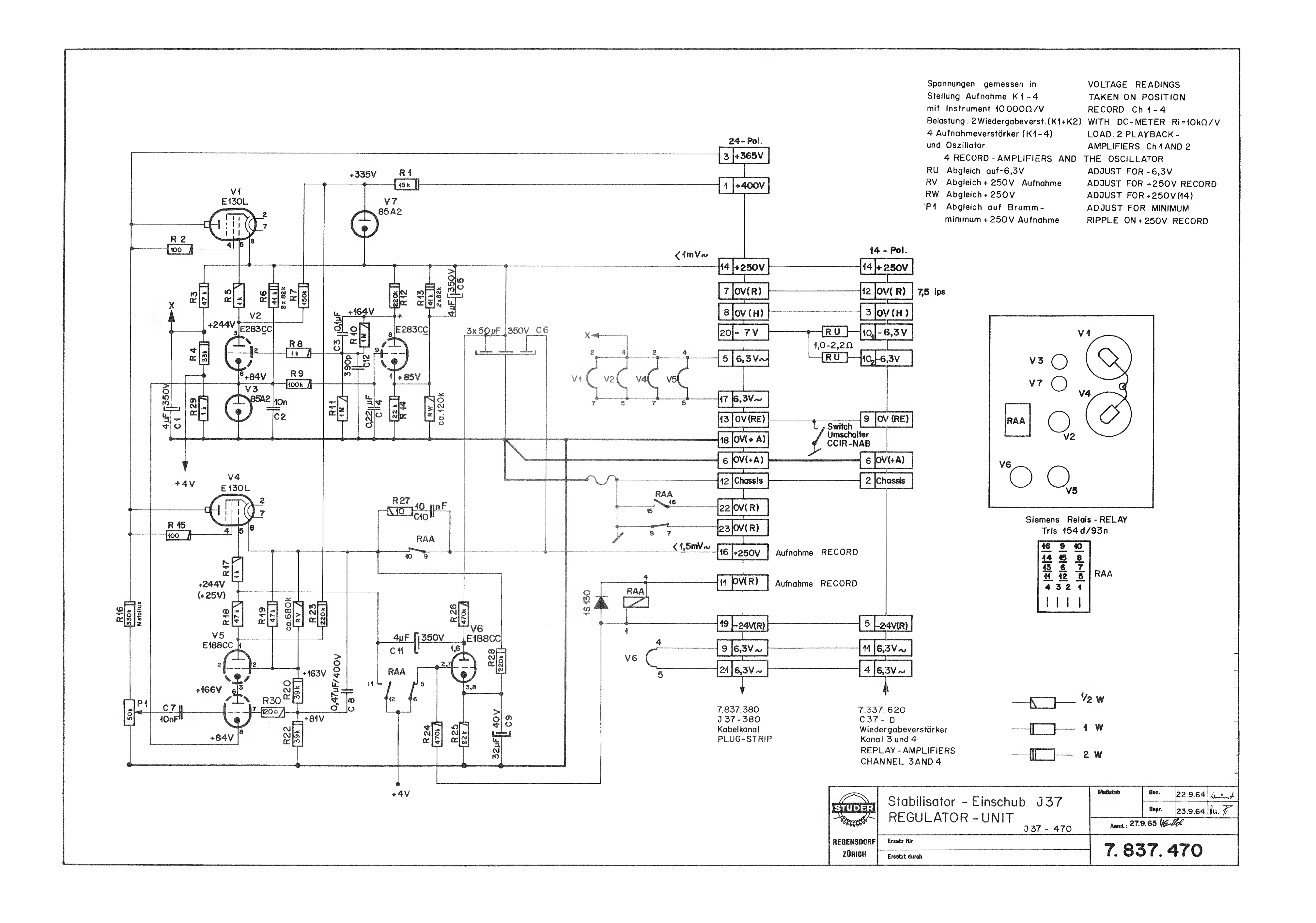


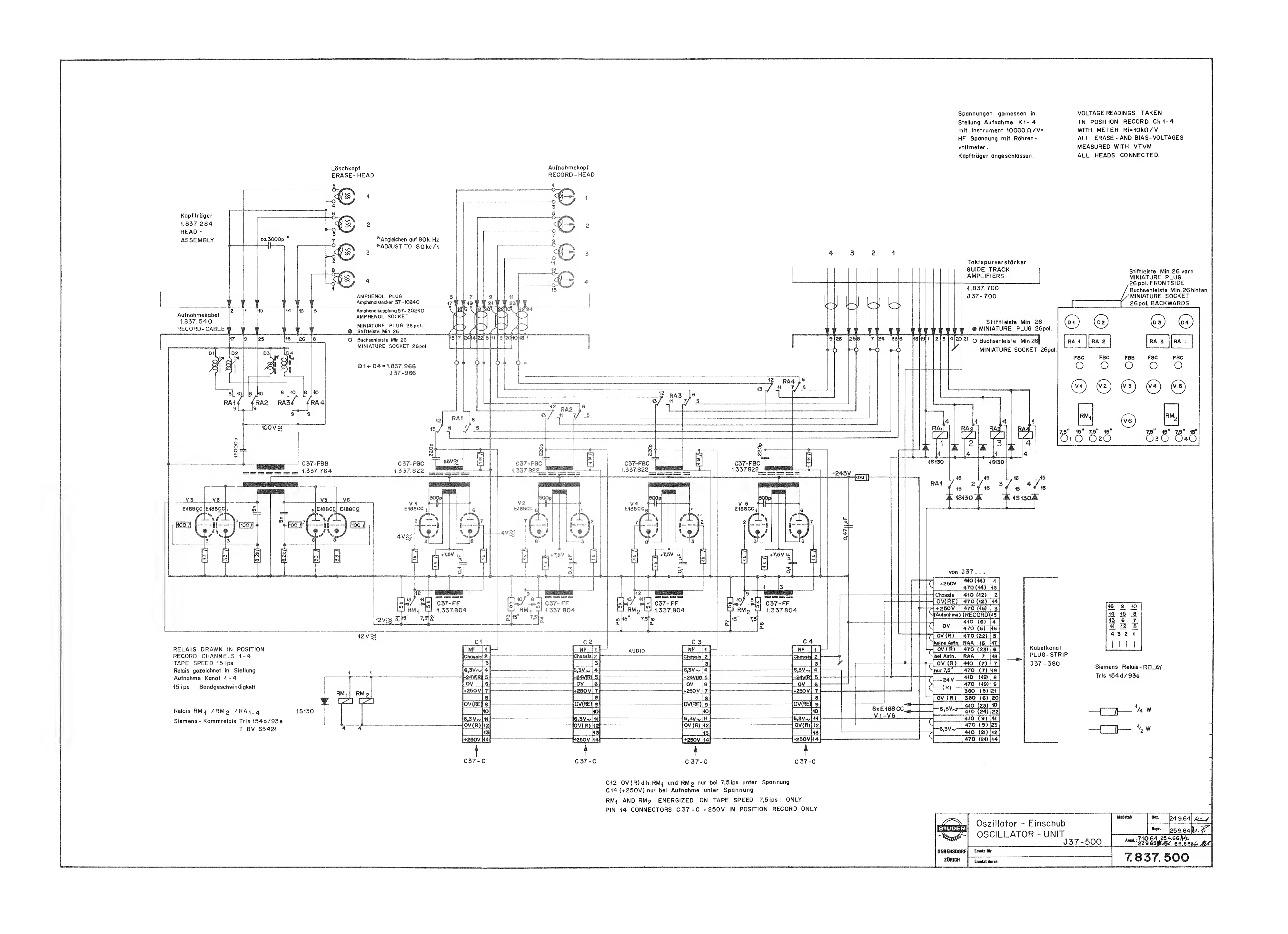
	Pegel LEVEL		Entzerrung EQUALIZ.	
ips	15	7,5	15	7,5
CCIR	P1	P3	P5	P7
NAB	P2	P4	P6	P8


V2
E283CC
V1.2
E188CC
V1.1
E186CC
V3
E188CC
V4
E188CC
Eingang
INPUT
Ausgang
OUTPUT
200Ω
Ri < 10%
HF-Filter
1.337.582
1.337.688
Schalter
SWITCH
Mono/Stereo
RLW
RE1
RE2
* THESE PARTS ARE NOT ON THE PRINTED CIRCUIT PANEL
* Diese Elemente sind nicht auf der gedruckten Schaltung
1/4 W 70°
1/2 W 70°
Siemens Relais - RELAY
154c 93d
154d 93e
Gezeichnet in Stellung
DRAWN IN POSITION
CCIR/15ips/Stereo
+255V
OVRL
6,3V~
-6,3V
OVRE
0V
-24V(R)
6,3V~
0V
Chassis
	Pegel LEVEL		Entzerrung EQUALIZ.	
ips	15	7,5	15	7,5
CCIR	P1	P3	C14	C18
NAB	P2	P4	C15	C19
STUDER
REGENSDORF
ZÜRICH
Wiedergabe-Verstärker
CCIR - NAB
PLAYBACK - AMPLIFIER
Maßstab
Gez. 2.11.64
Gepr. 3.11.64
Norm.
Kopie für:
Ersatz für:
Ersetzt durch:
7.337.990

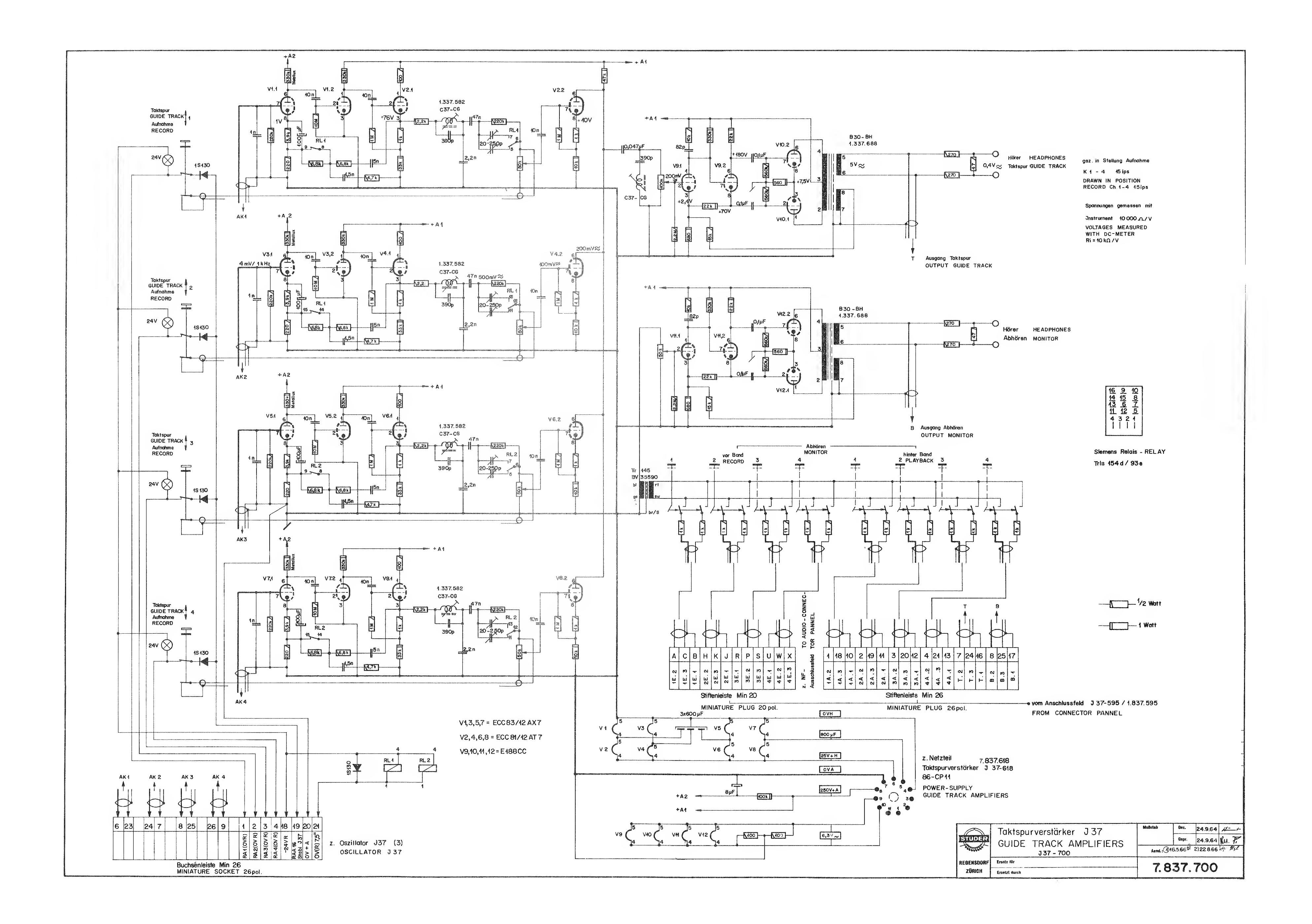


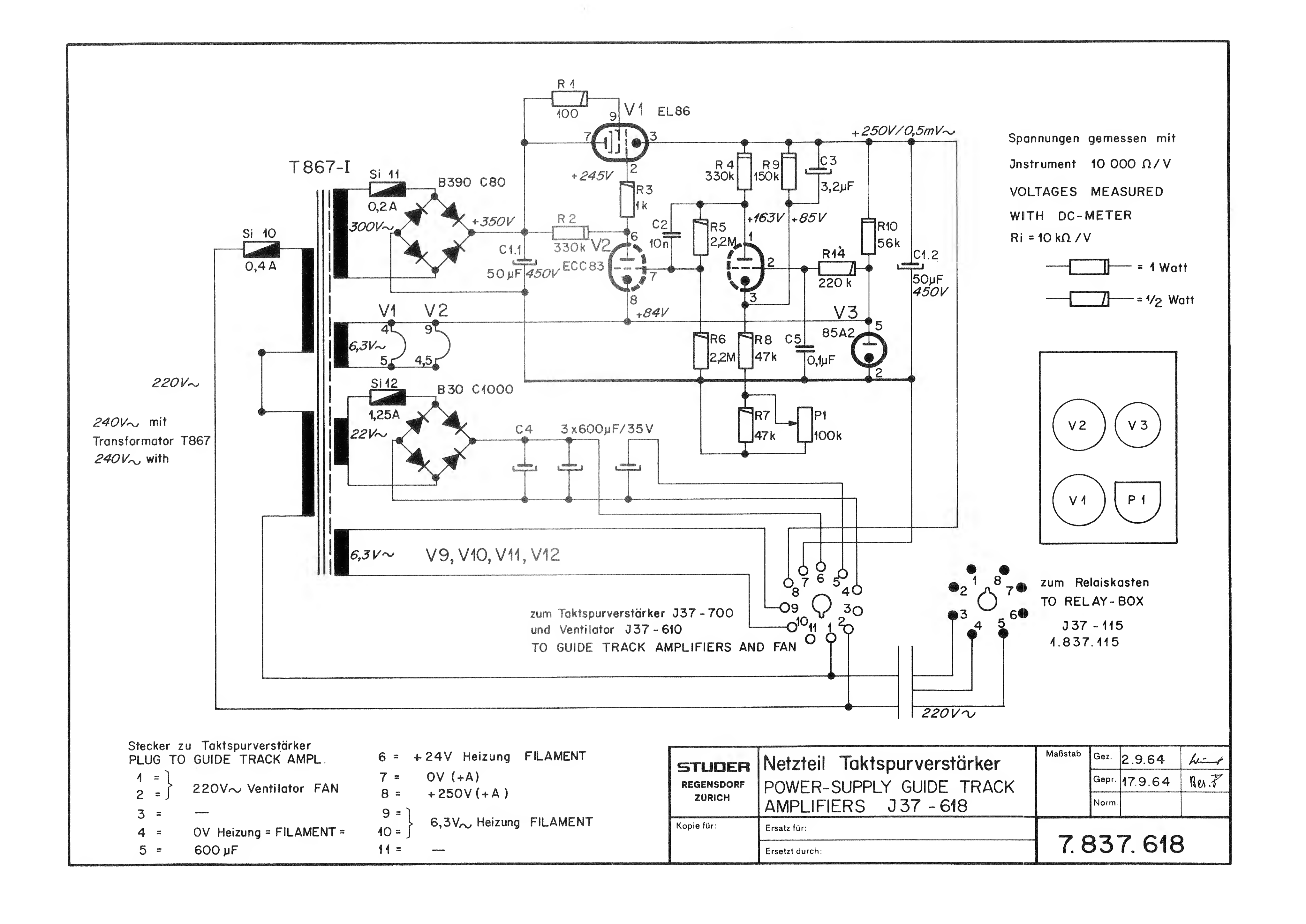
T 863/I
B250 C75
24 - Pol.
14 - Pol.
125V~
C1 8µF/250V
S6
1A
S8
0,63A
OA 214 (4x)
220V~
290V~
C2
25µF/
25µF/500V
6,3 V~
1 +400V
14 +250V
18 0V(+A)
3 +365V
6 0V
5 6,3V~
17 6,3V~
+100V
14 +250V
6 0V(+A)
S9 blau = Farbcode am Einsatz
Alle Schmelzeinsätze 5 x 20 träge
S9 BLUE = COLOURCODE ON EXTRACTOR
ALL FUSES 5x20mm SLOW-BLOW
6,3A
S9
blau
BLUE
0,6A
S8
schwarz
BLACK
0,8A
S7
schwarz
BLACK
1A
S6
schwarz
BLACK
POWER SUPPLY UNIT
TAPE TRANSPORT
Netzgerät
Laufwerk
J 37- 150
7.837.150
220V~
Stecker
PLUG
7 0V(R)
19 -24V(R)
8 0V(+H)
16 0V(RE)
12 0V(R)
(7,5 ips)
5 -24V(R)
3 0V(+H)
9 0V(RE)
T 864/I
S9
6,3A
OY 5061 (4x)
11,5V~
S7
0,8A
ZL7
-7,5V
C4
500uF/15V
R1
56
C3
5000µF/35V
-10,5V
ASZ 18
ASZ 18
RW
RW
10₁ -6,3V
10₂ -6,3V
100 mV~
20 -7V
6,3V~
R2
100
R3
100
9/10 6,3V~
11 6,3V~
21/22 6,3V~
4 6,3V~
6,3V~
R4
100
R5
100
23 6,3V~
24 6,3V~
12 Chassis
2 Chassis
1W
1/2 W
J 37-380
7.837.380
Kabelkanal
PLUG-STRIP
C 37-D 2x
7.337.620
Wiedergabeverstärker
Kanal 1 und 2
REPLAY-AMPLIFIERS
CHANNEL 1 AND 2
RW = ca. 1 Ω, Abgleich auf -6,3V
RW = approx 1Ω, ADJUST FOR -6,3V
STUDER
REGENSDORF
ZÜRICH
Netzteil Verstärker J37
POWER SUPPLY, AMPLIFIERS
J37-410
Ersatz für
Ersetzt durch
Maßstab
Gez. 18.9.64
Gepr. 18.9.64
Aend.: 27.9.65
7.837.410


Spannungen gemessen in Stellung Aufnahme K1-4 mit Instrument 10000Ω/V
Belastung: 2 Wiedergabeverst. (K1+K2) 4 Aufnahmeverstärker (K1-4) und Oszillator.
VOLTAGE READINGS TAKEN ON POSITION RECORD Ch 1-4 WITH DC-METER Ri=10kΩ/V
LOAD: 2 PLAYBACK-AMPLIFIERS Ch 1 AND 2
4 RECORD-AMPLIFIERS AND THE OSCILLATOR
RU Abgleich auf -6,3V
RV Abgleich +250V Aufnahme
RW Abgleich +250V
P1 Abgleich auf Brumm-minimum +250V Aufnahme
ADJUST FOR -6,3V
ADJUST FOR +250V RECORD
ADJUST FOR +250V(14)
ADJUST FOR MINIMUM RIPPLE ON +250V RECORD
24-Pol.
14-Pol.
Switch Umschalter CCIR-NAB
Aufnahme RECORD
7.837.380
J 37-380
Kabelkanal
PLUG-STRIP
7.337.620
C 37-D
Wiedergabeverstärker Kanal 3 und 4
REPLAY-AMPLIFIERS CHANNEL 3 AND 4
Siemens Relais-RELAY
Trls 154 d/93n
RAA
1/2 W
1 W
2 W
Stabilisator - Einschub J37
REGULATOR - UNIT
J 37 - 470
STUDER
REGENSDORF
ZÜRICH
Ersatz für
Ersetzt durch
Maßstab
Gez. 22.9.64
Gepr. 23.9.64
Aend.: 27.9.65
7.837.470



Spannungen gemessen in
Stellung Aufnahme K1-4
mit Instrument 10000 Ω/V=
HF-Spannung mit Röhrenvoltmeter.
Kopfträger angeschlossen.
VOLTAGE READINGS TAKEN
IN POSITION RECORD Ch 1-4
WITH METER Ri=10kΩ/V
ALL ERASE-AND BIAS-VOLTAGES
MEASURED WITH VTVM
ALL HEADS CONNECTED.
Löschkopf
ERASE-HEAD
Aufnahmekopf
RECORD-HEAD
Kopfträger
1.837 284
HEAD-ASSEMBLY
ca.3000p
*Abgleichen auf 80k Hz
*ADJUST TO 80kc/s
AMPHENOL PLUG
Amphenolstecker 57-10240
Amphenolkupplung 57-20240
AMPHENOL SOCKET
MINIATURE PLUG 26pol.
Stiftleiste Min 26
Buchsenleiste Min 26
MINIATURE SOCKET 26pol
Aufnahmekabel
1.837.540
RECORD-CABLE
D1 ÷ D4 = 1.837.966
J37-966
Taktspurverstärker
GUIDE TRACK
AMPLIFIERS
1.837.700
J37-700
Stiftleiste Min 26
MINIATURE PLUG 26pol.
Buchsenleiste Min 26
MINIATURE SOCKET 26pol.
Stiftleiste Min 26 vorn
MINIATURE PLUG
26 pol. FRONTSIDE
Buchsenleiste Min 26 hinten
MINIATURE SOCKET
26pol. BACKWARDS
C37-FBB
1.337.764
C37-FBC
1.337.822
C37-FF
1.337.804
E188CC
+245V
RELAIS DRAWN IN POSITION
RECORD CHANNELS 1-4
TAPE SPEED 15 ips
Relais gezeichnet in Stellung
Aufnahme Kanal 1÷4
15 ips Bandgeschwindigkeit
Relais RM1 /RM2 /RA1-4
Siemens-Kammrelais Trls 154d/93e
T BV 65421
1S130
C37-C
AUDIO
von J37...
6x E188CC
V1-V6
Kabelkanal
PLUG-STRIP
J37-380
Siemens Relais-RELAY
Trls 154d/93e
1/4 W
1/2 W
C12 OV(R) d.h RM1 und RM2 nur bei 7,5ips unter Spannung
C14 (+250V) nur bei Aufnahme unter Spannung
RM1 AND RM2 ENERGIZED ON TAPE SPEED 7,5ips: ONLY
PIN 14 CONNECTORS C37-C +250V IN POSITION RECORD ONLY
STUDER
REGENSDORF
ZÜRICH
Oszillator - Einschub
OSCILLATOR - UNIT
J37-500
Ersatz für
Ersetzt durch
7.837.500

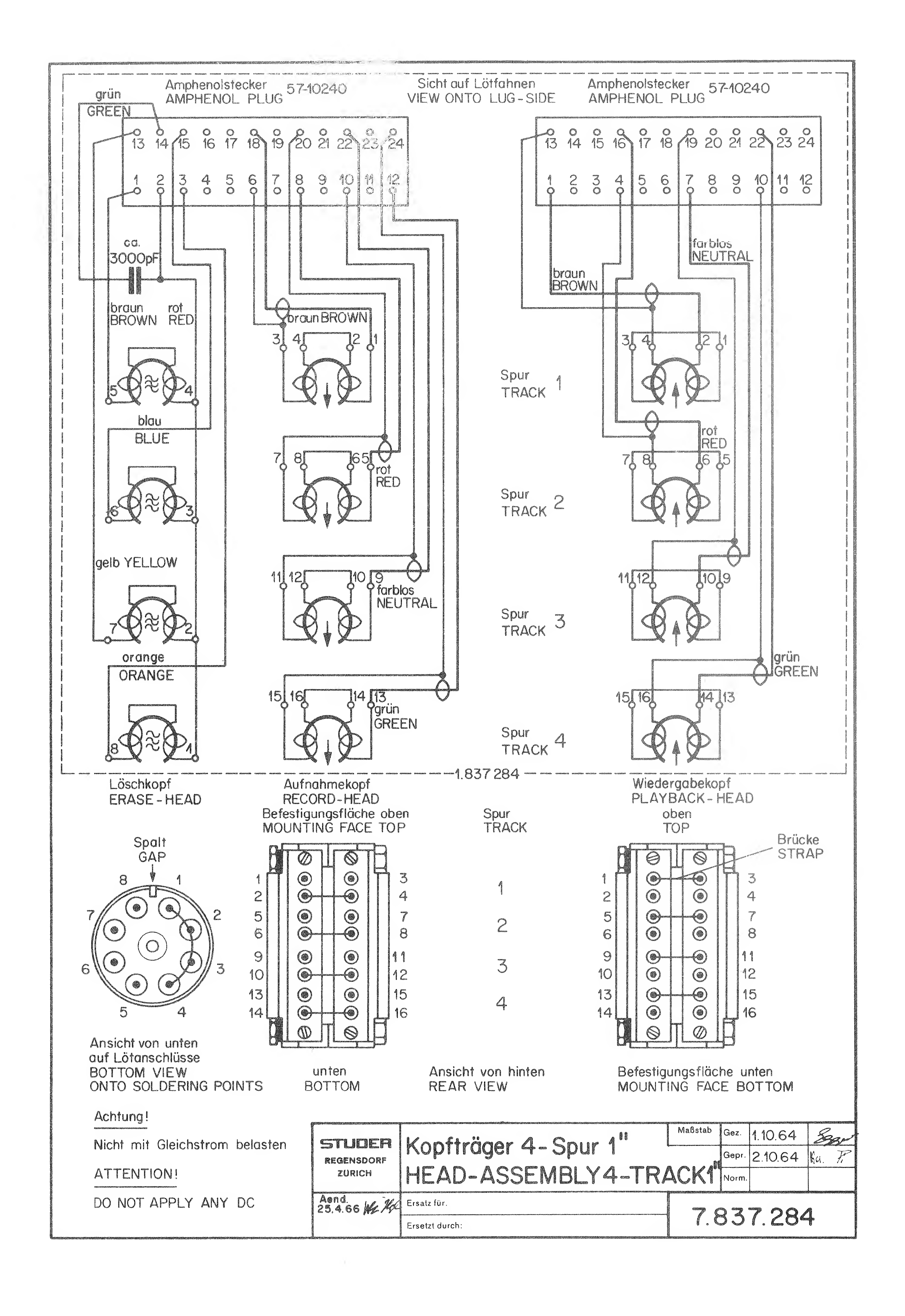

Taktspurverstärker J 37
GUIDE TRACK AMPLIFIERS
J 37 - 700
7.837.700
STUDER
REGENSDORF ZÜRICH
V1,3,5,7 = ECC83/12AX7
V2,4,6,8 = ECC81/12AT7
V9,10,11,12 = E188CC
gez. in Stellung Aufnahme
K 1 - 4 15ips
DRAWN IN POSITION
RECORD Ch 1-4 15ips
Spannungen gemessen mit
Instrument 10000 Ω/V
VOLTAGES MEASURED
WITH DC-METER
Ri = 10 kΩ/V
Hörer HEADPHONES
Taktspur GUIDE TRACK
Ausgang Taktspur
OUTPUT GUIDE TRACK
Hörer HEADPHONES
Abhören MONITOR
Ausgang Abhören
OUTPUT MONITOR
Siemens Relais - RELAY
Trls 154d/93e
1/2 Watt
1 Watt
Stiftenleiste Min 20
MINIATURE PLUG 20 pol.
Stiftenleiste Min 26
MINIATURE PLUG 26 pol.
vom Anschlussfeld J 37-595 / 1.837.595
FROM CONNECTOR PANNEL
z. NF. Anschlussfeld
TO AUDIO-CONNECTOR PANNEL
z. Netzteil 7.837.618
Taktspurverstärker J 37-618
86-CP11
POWER-SUPPLY
GUIDE TRACK AMPLIFIERS
Buchsenleiste Min 26
MINIATURE SOCKET 26 pol.
z. Oszillator J37 (3)
OSCILLATOR J 37
Taktspur GUIDE TRACK
Aufnahme RECORD
vor Band RECORD
hinter Band PLAYBACK
Abhören MONITOR
B30-BH 1.337.688
1.337.582 C37-C6



Stecker zu Taktspurverstärker
PLUG TO GUIDE TRACK AMPL.

1 = 2 =	220V~ Ventilator FAN
3 =	—
4 =	0V Heizung = FILAMENT =
5 =	600 µF
6 =	+24V Heizung FILAMENT
7 =	0V (+A)
8 =	+250V (+A)
9 = 10 =	6,3V~ Heizung FILAMENT
11 =	—

STUDER REGENSDORF ZÜRICH	Netzteil Taktspurverstärker POWER-SUPPLY GUIDE TRACK AMPLIFIERS J37 - 618	Maßstab	Gez. 2.9.64
			Gepr. 17.9.64
			Norm.
Kopie für:	Ersatz für: Ersetzt durch:	7.837.618	



Achtung!

Nicht mit Gleichstrom belasten

ATTENTION!

DO NOT APPLY ANY DC

STUDER REGENSDORF ZÜRICH	Kopfträger 4-Spur 1" HEAD-ASSEMBLY 4-TRACK 1"	Maßstab	Gez. 1.10.64	Gepr. 2.10.64	Norm.
Aend. 25.4.66	Ersatz für:	Ersetzt durch:	7.837.284		

Amphenol-kupplung 57-20240

1 2 3 4 5 6 7 8 9 10 11 12

13 14 15 16 17 18 19 20 21 22 23 24

AMPHENOL-SOCKET 57-20240

Sicht auf Lötfahnen

VIEW ONTO LUG-SIDE

Kopfträger Spur

Löschkopf/ERASE-HEAD 1 2 3 4

1.837.284

Aufnahmekopf/RECORD-HEAD 1 2 3 4

HEAD-ASSEMBLY TRACK

braun/BROWN, rot/RED, blau/BLUE, gelb/YELLOW, grün/GREEN, orange/ORANGE

braun BROWN, rot RED, farblos NEUTRAL, grün GREEN

Amphenol-stecker 57-10240

AMPHENOL-PLUG 57-10240

1 2 15 13 14 3 4 16 17 5 18 6 7 19 8 20 21 9 22 10 11 23 12 24

Amphenol-kupplung 57-20240

AMPHENOL-SOCKET 57-20240

SCREEN

Aufnahme-Kabel 1.837.540

braun / BROWN, rot / RED, blau / BLUE, gelb / YELLOW, grün / GREEN, orange / ORANGE

gelb / YELLOW, farblos / NEUTRAL, braun / BROWN, farblos / NEUTRAL, rot / RED, farblos / NEUTRAL, grün / GREEN, farblos / NEUTRAL

RECORD CABLE 1.837.540

Abschirmung

Stiftleiste Min26

MINIATURE PLUG 26 pol

6 9 17 25 26 16 8 21 13 23 15 7 24 4 14 22 5 12 11 3 20 19 10 18 1 2

Buchsen-leiste Min26

MINIATURE PLUG 26 pol

10 10 10 10 12 6 12 6 12 6 12 6

RA1 RA2 RA3 RA4 RA1 RA2 RA3 RA4

Oszillator - Einschub 1.837.500 OSCILLATOR-UNIT

Stiftleiste Min 26

1 2 3 4 5 6 7 8 9

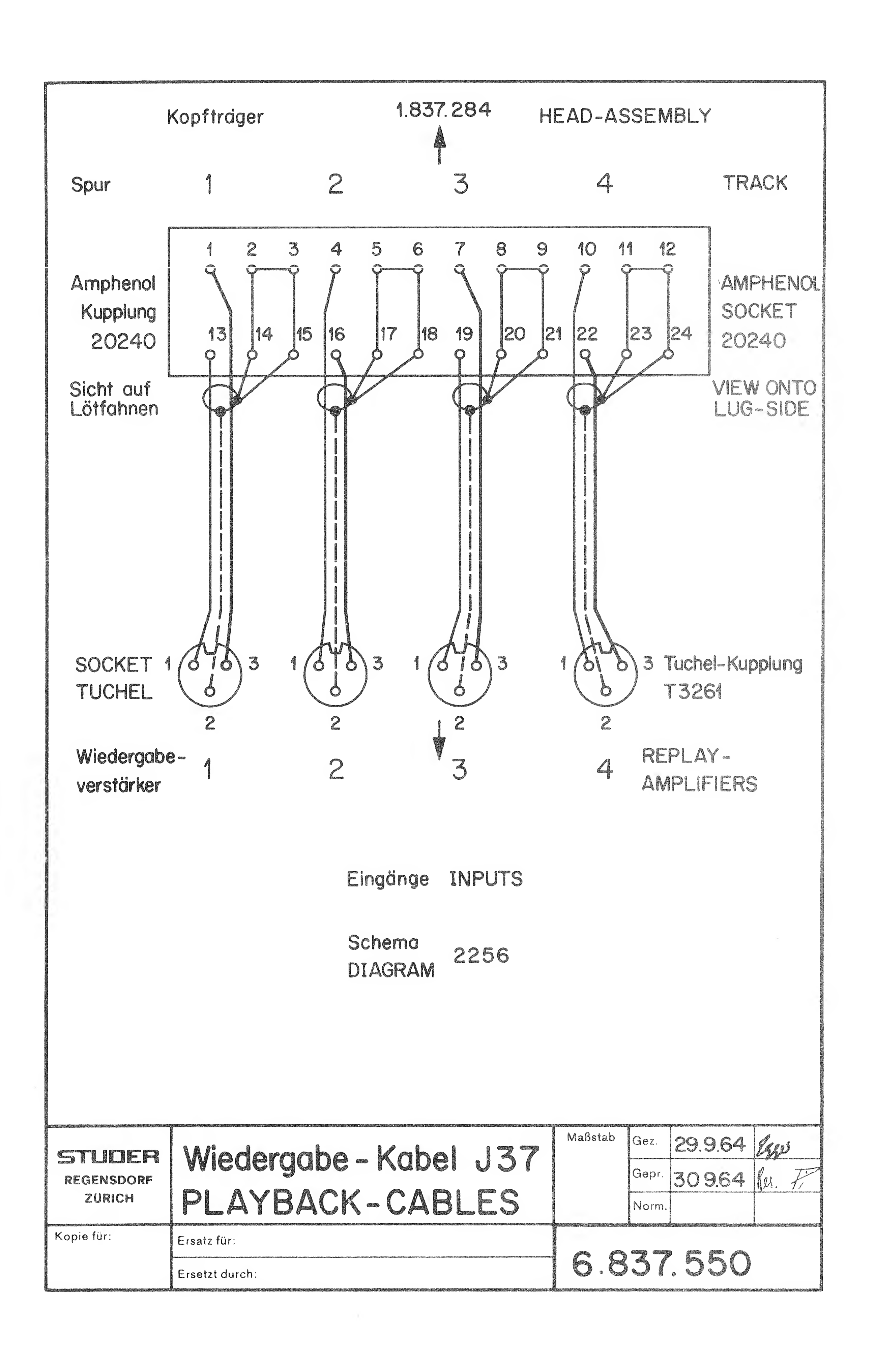
10 11 12 13 14 15 16 17

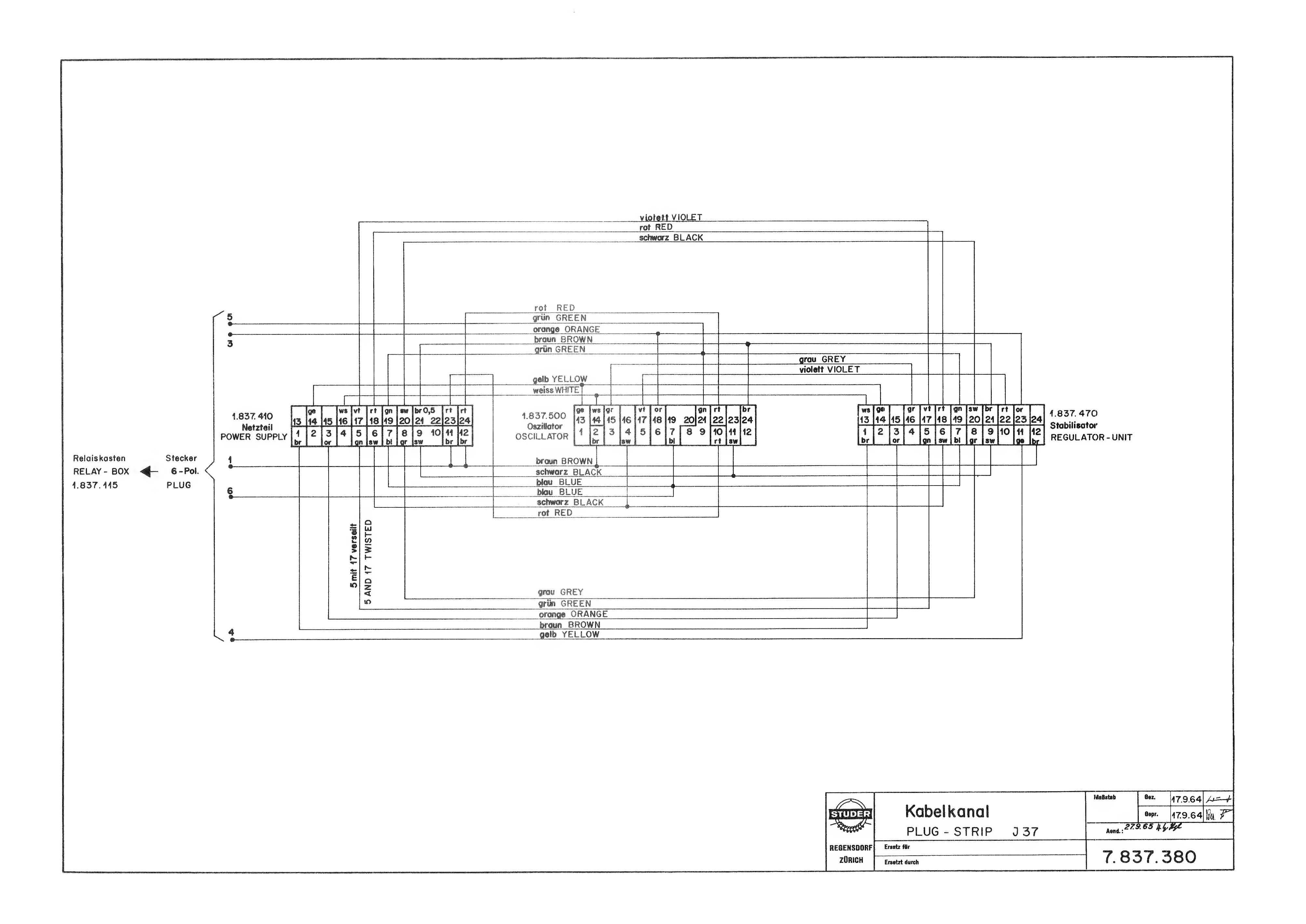
18 19 20 21 22 23 24 25 26

MINIATURE PLUG 26 pol.

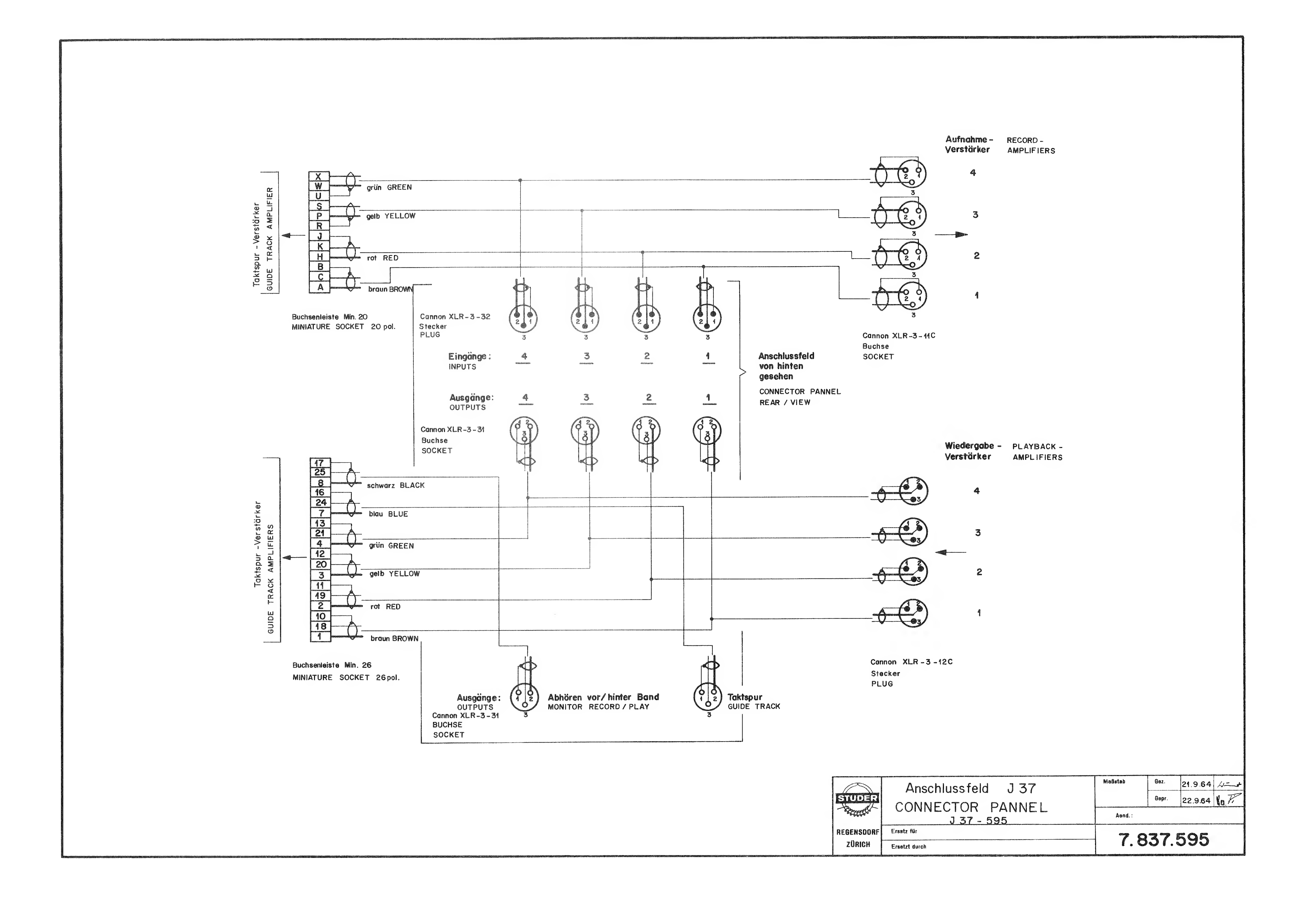
Sicht auf Lötfahnen
VIEW ONTO LUG-SIDE

STUDER REGENSDORF ZÜRICH	Aufnahme - Kabel J37 RECORD - CABLE	Maßstab	Gez 5.10.64	Gepr 6.10.64	Norm
Kopie für:	Ersatz für: / Ersetzt durch	6.837.540			


Kopfträger
1.837.284
HEAD-ASSEMBLY
Spur
1
2
3
4
TRACK
1 2 3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22 23 24
Amphenol
Kupplung
20240
AMPHENOL
SOCKET
20240
Sicht auf
Lötfahnen
VIEW ONTO
LUG-SIDE
SOCKET
TUCHEL
1 3 2
Tuchel-Kupplung
T3261
Wiedergabe-
verstärker
1
2
3
4
REPLAY-
AMPLIFIERS
Eingänge INPUTS
Schema
DIAGRAM
2256
STUDER
REGENSDORF
ZÜRICH
Wiedergabe-Kabel J37
PLAYBACK-CABLES
Maßstab
Gez. 29.9.64
Gepr. 30.9.64
Norm.
Kopie für:
Ersatz für:
Ersetzt durch:
6.837.550



STUDER	**Kabelkanal**	Maßstab	Gez. 17.9.64
	PLUG - STRIP J 37		Gepr. 17.9.64
		Aend.: 27.9.65	
REGENSDORF ZÜRICH	Ersatz für / Ersetzt durch		7.837.380


Aufnahme - Verstärker
RECORD - AMPLIFIERS
Taktspur - Verstärker
GUIDE TRACK AMPLIFIER
X W U S P R J K H B C A
grün GREEN
gelb YELLOW
rot RED
braun BROWN
Buchsenleiste Min. 20
MINIATURE SOCKET 20 pol.
Cannon XLR-3-32
Stecker
PLUG
Eingänge: INPUTS
Ausgänge: OUTPUTS
Cannon XLR-3-31
Buchse
SOCKET
Anschlussfeld von hinten gesehen
CONNECTOR PANNEL REAR / VIEW
Cannon XLR-3-11C
Buchse
SOCKET
Wiedergabe - Verstärker
PLAYBACK - AMPLIFIERS
Taktspur - Verstärker
GUIDE TRACK AMPLIFIERS
17 25 8 16 24 7 13 21 4 12 20 3 11 19 2 10 18 1
schwarz BLACK
blau BLUE
grün GREEN
gelb YELLOW
rot RED
braun BROWN
Buchsenleiste Min. 26
MINIATURE SOCKET 26 pol.
Cannon XLR-3-12C
Stecker
PLUG
Ausgänge: OUTPUTS
Cannon XLR-3-31
BUCHSE
SOCKET
Abhören vor/hinter Band
MONITOR RECORD / PLAY
Taktspur
GUIDE TRACK
Anschlussfeld J 37
CONNECTOR PANNEL
J 37 - 595
STUDER
REGENSDORF ZÜRICH
Maßstab
Gez. 21.9.64
Gepr. 22.9.64
Aend.:
Ersatz für
Ersetzt durch
7.837.595